NOTICE

All drawings located at the end of the document.

Resource Conservation and Recovery Act
Post-Closure Care Permit Application

For U.S.D.O.E -Rocky Flats Plant
Hazardous & Radioactive Mixed Wastes

CO7890010526

5 October 1988

Volume XV

Prepared by:

ROCKWELL INTERNATIONAL

North American Aerospace Operations

Reviewed for Classification/OUO/UCNI
By: Janet Nesheim, Derivative Classifier
DOE, EMCBC
Date: 10-15-08
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Note: Pages extracted from draft "A Historical Summation of Environmental Incidents Affecting Soils At or Near the U.S. AEC Rocky Flats Plant," by J. B. Owen & L. M. Steward are no ~~tag~~ longer OUO. Markings have been crossed off on individual pages.

In Association with:

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Chen & Assoc , Inc

REVIEWED FOR CLASSIFICATION/UCNI
By [signature] (UNU)
Date 4/1/92

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Revision No.: 1

RCRA POST-CLOSURE CARE PERMIT
CONTENTS OF VOLUMES

ORIGINAL PROCESS WASTE LINES

CLOSURE PLAN

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS PLANT
GOLDEN, COLORADO

OCTOBER 3, 1988

ROCKWELL INTERNATIONAL
NORTH AMERICAN AEROSPACE OPERATIONS
ROCKY FLATS PLANT

APPENDIX 2

ORIGINAL PROCESS WASTE LINES DATA SUMMARY SHEETS

2.1 Pipes
2.2 Tanks

APPENDIX 2 : ORIGINAL PROCESS WASTE LINES DATA SUMMARY SHEETS

The data summary sheets present all available data on the original process waste lines (OPWL) pipes and tanks. One summary sheet is provided for each pipe designation and one for each tank designation.

The data is presented in matrix form to allow comparison of information from several references. Across the top of the page are reference numbers which correspond to the references at the beginning of the respective section on pipes (2.1 Pipes) and tanks (2.2 Tanks). The information presented on each data sheet below the respective reference number was obtained from the corresponding reference.

2.1 PIPES

C07890010526

Date October 3, 1988
Revision No 1

ORIGINAL PROCESS WASTE LINES

PIPES

SUMMARY DATA SHEETS

REFERENCES

(1) ORIGINAL PROCESS WASTE LINE CLOSURE PLAN, Appendix A-5 of the Post-Closure Care Permit Application, November 26, 1986 Revision 0

(2) CONCEPTUAL DESIGN REPORT, ENVIRONMENTAL IMPROVEMENT PROJECTS, Rockwell International, Rocky Flats Plant, Golden, Colorado, December, 1985

(3) ROCKWELL INTERNATIONAL DRAWINGS, Specific drawing is indicated at each reference note

(4) SURVEY OF THE STATUS OF THE EXISTING PROCESS WASTE LINES, Sunday, G , September, 1976, Unnumbered Report

(5) PROCESS WASTE LAYOUT, Drawing Number SK-410204-2, The Dow Chemical Company, March, 1971

(6) REPORT OF AN INVESTIGATION ON A RECENT PROCESS WASTE PIPELINE LEAK, Rockwell International, October 24, 1980, ES 376-80 217

(7) UNUSUAL OCCURENCE REPORT - VALVE VAULT #7 OVERFLOW, APRIL 4, 1983, Rockwell International, May 5, 1983, UOR NUMBER RFP 83 2-SAGE 83-1

(8) A HISTORICAL SUMMATION OF ENVIRONMENTAL INCIDENTS AFFECTING SOILS AT OR NEAR THE U S AEC ROCKY FLATS PLANT, Dow Chemical, Undated (approximate date fall 1983), By J B. Owen and L M Steward (Draft) (DRAFT)

Original Process Waste Line
Data Summary Sheet

Pipe Designation: P-1
Appendix 1 Map: E-2
Building Area: 123
SWMU Number: 121

Pipes	Reference: (1)	Reference: (2)	Reference: (4)	Reference: ( )
Pipe Material:	Polyethylene in steel		Polyethylene in steel	
Description of Pipe Section:		Western section of A-25	Exits south side of Building 123	
Pipe Diameter (in.):	3 inside 4		3 inside 4	
Pipe Length (ft.):	180	89*	120	
Line Volume (cubic feet):				
Date of Installation:	1968		1968	
Date of Abandonment:	June 1982			
Age (Years):	14			
Disposition:	Abandoned	Abandoned		
Waste Streams:			Small amounts of low level lab wastes w/ nitrates; went to solar ponds	
Reported Releases:	None		Leak of 2.5 gal/hr at 37 psig found in 1971	
Comments:		*Excludes portion beneath building		

Original Process Waste Line
Data Summary Sheet

Pipes

Pipe Designation: P-2
Appendix 1 Map: E-2
Building Area: 123
SWMU Number: 121

Pipes	Reference: (1)	Reference: (4)	Reference: ( )	Reference: ( )
Pipe Material:	Cast iron	Cast iron		
Description of Pipe Section:		P-2		
Pipe Diameter (in.):	4	4		
Pipe Length (ft.):	452			
Line Volume (cubic feet)				
Date of Installation:	1952	Approx. 1953		
Date of Abandonment:	June 1982			
Age (Years):	30			
Disposition:	Decontaminated, removed and replaced with inspectable pipe			
Waste Streams:				
Reported Releases:	Yes;at P-2 beneath Building 123			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes

Pipe Designation: P-3
Appendix 1 Map: E-2
Building Area: 441
SWMU Number: 121

	Reference: (1)	Reference: (2)	Reference: (4)	Reference: ( )
Pipe Material:	Vitrified clay		Vitrified clay	
Description of Pipe Section:		Eastern portion of A-25	West of Building 441	
Pipe Diameter (in.):	4		4	
Pipe Length (ft.):	162	92*	162	
Line Volume (cubic feet):				
Date of Installation:	1952		1952	
Date of Abandonment:	June 1982			
Age (Years):	30			
Disposition:	Decontaminated, removed and replaced with inspectable pipe	Abandoned		
Waste Streams:			Small amounts of low level lab waste with nitrates; went to solar ponds	
Reported Releases:	None		Leak of 2.5 gal/hr at 37 psig found in 1971	
Comments:		*Does not include portion beneath building		

Original Process Waste Line
Data Summary Sheet

Pipe Designation: P-4
Appendix 1 Map: E-2, E-3, E-4, E-5
Building Area: 441 - 879
SWMU Number: 121

Pipes	Reference: (1)	Reference: (2)	Reference: (4)	Reference: ( )
Pipe Material:	Cast iron		Cast iron	
Description of Pipe Section:		Pipe A-23	Portion between Building 444 and 883	
Pipe Diameter (in.):	4		4	
Pipe Length (ft.):	1750	1750	1193	
Line Volume (cubic feet):				
Date of Installation:	1952		1952	
Date of Abandonment:	April 1981			
Age (Years):	29			
Disposition:	Abandoned	Abandoned		
Waste Streams:			Building 123-small amounts of low-level lab wastes w/nitrates; went to solar ponds. Building 441-low-level uranium w/98% depleted uranium. Building 444-depleted uranium.	
Reported Releases:	Yes; at P-4 & T-3/ Yes; at P-4 & S1 Yes; at "two other locations on P-4" Yes; at P-4 & P-6		Small leak found near delivery in Bldg. 663 in 1960-1962;small portion of line replaced no subsequent reported leaks. Leak of 2.5 gal/hr at 37 psig found in 1971.	
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: ( )
Pipe Designation: P-5 Appendix 1 Map: E-3, F-3 Building Area: 444 SWMU Number: 121			DWGS 25838-X05 to X10 DWGS 25838-DX1,D01 to D05	
Pipe Material:	Cast iron			
Description of Pipe Section:		Pipe A-24	P-5	
Pipe Diameter (in.):	4		2,3,4,6	
Pipe Length (ft.):	1561	175*		
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:	April 1981			
Age (Years):				
Disposition:	Decontaminated, removed and replaced with inspectable pipe	Abandoned	.Portion of building was abandoned in place .Small portion was decontaminated first .DWGS indicate pipes could be removed or abandoned after August 1, 1978 .Other DWGS indicate to flush clean, seal and abandon	
Waste Streams:			Process waste	
Reported Releases:	Yes; at P-4 & P-5			
Comments:		*Does not include portion beneath the building		

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (4)
Pipe Designation: P-6 Appendix 1 Map: E-5, F-5 Building Area: 881 SWMU Number: 121			DWGS 25609-X08 to -X09	
Pipe Material:	Steel		Stainless steel	Steel
Description of Pipe Section:		Pipes A-19, A-22 and A-29	Portion of P-6 adjacent to T-24 and T-32	From 881 to west of 884
Pipe Diameter (in.):	3		3	
Pipe Length (ft.):	1300	820*		865
Line Volume (cubic feet):				
Date of Installation:	1957			1957
Date of Abandonment:	December 1980		After 7/2/76	
Age (Years):	30			
Disposition:	Abandoned	Abandoned	Abandoned that portion adjacent to T24 and T32	
Waste Streams:			Process waste	Laundry waste, process and lab waste; caustic 95% enriched U-235
Reported Releases:	Yes @ P-6 near Bldg. 881 Yes @ P-4 and P-6 Yes @ P-6,9,10 & 11			
Comments:		*Does not include pipe beneath Bldg. 881		

Original Process Waste Line
Data Summary Sheet

Pipes		Reference: (3)	Reference: ( )	Reference: ( )	Reference: ( )
Pipe Designation:	P-6 cont.	DWG 15501-54			
Appendix 1 Map:	E-5, F-5				
Building Area:	881				
SWMU Number:	121				
Pipe Material:		Steel			
Description of Pipe Section:					
Pipe Diameter (in.):		3			
Pipe Length (ft.):					
Line Volume (cubic feet):					
Date of Installation:					
Date of Abandonment:					
Age (Years):					
Disposition:					
Waste Streams:		Process waste			
Reported Releases:		Yes-See P-6			
Comments:		P-54 begins at west of 881 and extends south to 887			

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (3)
Pipe Designation: P-7 Appendix 1 Map: F-5 Building Area: 881 - 887 SWMU Number: 121			DWGS 25609-X04 to -X06 & -X08	DWG 15507-4
Pipe Material:	Stainless steel		Cast iron Stainless steel	Stainless steel
Description of Pipe Section:		Pipe A-30 or A-31	P-7	Exits south side of 881, connects 81 and 87
Pipe Diameter (in.):	4		2,4	4
Pipe Length (ft.):	440	A-30=75', A-31=75'*		
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:	December 1980		After 7/2/76	
Age (Years):	28			
Disposition:	Abandoned		Abandoned portion outside building	To be double contained under authorization #365556
Waste Streams:			Process waste	
Reported Releases:	None			
Comments:		*Does not include pipe beneath Bldg. 881		

Original Process Waste Line
Data Summary Sheet

Pipes

Pipe Designation: P-8
Appendix 1 Map: F-5
Building Area: 881 - 887
SWMU Number: 121

	Reference: (1)	Reference: (2)	Reference: (3)	Reference: ( )
			DWGS 25609-X01 to -X09	
Pipe Material:	Stainless steel		Cast iron	
Description of Pipe Section:		Pipe A-30 or A-31	Portion of P-8	
Pipe Diameter (in.):	2			
Pipe Length (ft.):	135	75' (A-30) & 75' (A-31)		
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:	December 1980	After 7/2/86		
Age (Years):	28			
Disposition:	Decontaminated, removed and replaced with inspectable pipe	Abandoned	Abandoned portion beneath building and outside of building; removed piping above floor slab	
Waste Streams:				
Reported Releases:	None			
Comments:		*Does not include pipe beneath Bldg. 881		

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (3)
				DWG 25609-X07
Pipe Designation: P-9				
Appendix 1 Map: E-5				
Building Area: 883				
SWMU Number: 121				
Pipe Material:	Steel		Steel	Stainless steel
Description of Pipe Section:		Pipe A-18	P-9	
Pipe Diameter (in.):	3		3	1 1/2
Pipe Length (ft.):	504	390*	504	40
Line Volume (cubic feet):				
Date of Installation:	1957		1957	
Date of Abandonment:	March 1984			
Age (Years):	27			
Disposition:	Decontaminated, removed and replaced with inspectable pipe	Abandoned		Abandoned after drawing date 7/2/76
Waste Streams:			Janitor water, process waste, and depleted uranium	Process waste
Reported Releases:	Yes-@ P-9 and P-6			
Comments:		*Does not include pipe beneath building		

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (4)
Pipe Designation: P-10 Appendix 1 Map: E-5 Building Area: 884 - 865 SWMU Number: 121			DWGS 26378-X01 to -X05	
Pipe Material:	Stainless steel			Stainless steel
Description of Pipe Section:		Pipe A-20 and A-21	P-10 beneath Bldg. 865	P-10
Pipe Diameter (in.):	3		3	3
Pipe Length (ft.):	1190	560*		550
Line Volume (cubic feet):				
Date of Installation:	1968			1968
Date of Abandonment:	May 1982			
Age (Years):	14			
Disposition:	Decontaminated, removed and replaced with inspectable pipe	Abandoned	All pipe beneath building capped and abandoned after 8/21/81	
Waste Streams:			Process waste	Decontamination water contains uranium and plutonium from Bldg. 889
Reported Releases:	Yes-@ P-10 and P-6			
Comments:		*Does not include pipe beneath Bldg. 865		

Original Process Waste Line
Data Summary Sheet

Pipes

Pipe Designation: P-11
Appendix 1 Map: D-5, E-5
Building Area: 884
SWMU Number: 121

	Reference: (1)	Reference: (2)	Reference: (4)	Reference: ( )
Pipe Material:	New FG inside old VCP		New FG inside old VCP	
Description of Pipe Section:		Southern portion of A-17	P-11	
Pipe Diameter (in.):	3 inside 10			
Pipe Length (ft.):	165	165	165	
Line Volume (cubic feet):				
Date of Installation:	1975		FG-1975, VCP-1952	
Date of Abandonment:	March 1984			
Age (Years):	9			
Disposition:	Abandoned	Abandoned	Removed the 3-inch portion of saran lined steel in 1975 and replaced it with 3-inch ribbed hose	
Waste Streams:				
Reported Releases:	Yes-@ P-11 and P-6		In May 1971, was found to leak @ 2.7 gal/hr @ 20 psig	
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes

Pipe Designation: P-12
Appendix 1 Map: D-5
Building Area: 708
SWMU Number: 121

Pipes	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (7)
Pipe Material:	Saran lined steel in VCP		Saran lined steel in VCP	P-12 or P-13 in between the 2 PSZ fences
Description of Pipe Section:		Part of Pipe A-17	Pipe between 881 and 707 (P-12)	
Pipe Diameter (in.):	3 inside 10		3 inside 10	
Pipe Length (ft.):	573	573	573	
Line Volume (cubic feet):				
Date of Installation:	1952		1952	
Date of Abandonment:	March 1984		1975	
Age (Years):	32		23	
Disposition:	Abandoned	Abandoned	Abandoned	
Waste Streams:				
Reported Releases:	Yes-@ P-12 and P-13		Yes, in May 1971, was found to leak 2.7 gal/hr @ 20 psig	Yes-valve vault #7 leak on 4/4/83
Comments:	Acid and steam destroyed VCP (outer shell); replaced by P-13			

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (8)
Pipe Designation: P-13 Appendix 1 Map: D-5 Building Area: 708 SWMU Number: 121				
Pipe Material:	Ribbed hose in fiberglass		Ribbed hose in fiberglass	
Description of Pipe Section:		Part of pipe A-17	Reinforced epoxy	P-12 or P-13 in between the two PSZ fences
Pipe Diameter (in.):	3 inside 4		3 inside 4	
Pipe Length (ft.):	523	523	523	
Line Volume (cubic feet):				
Date of Installation:	1975		1975	
Date of Abandonment:	March 1984			
Age (Years):	9			
Disposition:	Abandoned	Abandoned		
Waste Streams:				
Reported Releases:	Yes-@ intersection of P-13 and P-12			Yes-valve vault #7 leaked on 4/4/83
Comments:	P-13 replaced P-12 which was destroyed by acid & steam (see data summary P-12)	Pipes P-13 and P-12 are the same length and immediately adjacent to each other, the only corresponding pipe is A-17		

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (3)	Reference: ( )	Reference: ( )	Reference: ( )
Pipe Designation: P-13 (cont)	DWG 15501-30			
Appendix 1 Map: D-5				
Building Area: 708				
SWMU Number: 121				
Pipe Material:	Fiberglass inside fiberglass			
Description of Pipe Section:				
Pipe Diameter (in.):	3 inside 4			
Pipe Length (ft.):				
Line Volume (cubic feet):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:				
Waste Streams:	Process waste			
Reported Releases:				
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (8)
Pipe Designation: P-14 Appendix 1 Map: C-5 Building Area: 707 SWMU Number: 121				
Pipe Material:	Saran lined steel in VCP		Saran lined steel in VCP	
Description of Pipe Section:		Pipe A-16	P-14	P-14
Pipe Diameter (in.):	3 inside 10		3 inside 10	
Pipe Length (ft.):	625	625	942	
Line Volume (cubic feet):				
Date of Installation:	1952		1952	
Date of Abandonment:	1968		1968	
Age (Years):	16		16	
Disposition:	Decontaminated, removed and replaced with inspectable pipe	Abandoned	Abandoned-portions may have been removed for construction of Bldgs. 707 and 777.	
Waste Streams:			B441-low level lab waste w/98% depleted uranium. B444-process waste, depleted uranium. B123-low-level lab with nitrate. B881-laundry process and lab waste, 95% enriched U-235. B883-Janitor water process waste, caustic depleted U.	
Reported Releases:	None		Acid leaks @ P-14 and P-12, P-13	"Some soil has been infiltrated in the immediate vicinity of the lines original location."

Original Process Waste Line
Data Summary Sheet

Pipes

Pipe Designation: P-15
Appendix 1 Map: C-5
Building Area: 707
SWMU Number: 121

	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (3)
				DWG 15501-30
Pipe Material:	Stainless steel		Stainless steel	Stainless steel/ saran lined pipe inside vitrified clay
Description of Pipe Section:		Pipes A-13, A-15 and part of A-7	P-15	N&W sides of Bldg. 707
Pipe Diameter (in.):	3		3	3 and 3 inside 10
Pipe Length (ft.):	878	850	878	740
Line Volume (cubic feet):				
Date of Installation:	1968		1968	
Date of Abandonment:	March 1984			
Age (Years):	16			
Disposition:	Abandoned	Abandoned		
Waste Streams:			B123-Low level lab waste with nitrates. B444-Process waste, depleted uranium. B559-Plutonium lab waste. B889-Decontamination water w/Pu & U. B881-Laundry waste, process and lab waste, caustic, 95% enriched U-235. B883-Janitor water and process waste, depleted U.	Process waste
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes

Pipe Designation: P-16
Appendix 1 Map: C4,C5
Building Area: 528
SWMU Number: 121

	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (4)
			DWG15501-20 25609-1	
Pipe Material:	Polyvinyl chloride		Stainless steel/PVC	Polyvinyl chloride
Description of Pipe Section:				P-16
Pipe Diameter (in.):	3		1 1/2, 2 1/2, & 3	3
Pipe Length (ft.):	170	165	130	170
Line Volume (cubic feet):				
Date of Installation:	1968			1968
Date of Abandonment:	July 1982			
Age (Years):	14			
Disposition:	Abandoned	Abandoned		
Waste Streams:			Process waste	B559-lab waste, activity is Pu
Reported Releases:	Yes-@ P-16 & T-7			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (3)	Reference: (3)	Reference: (4)
Pipe Designation: P-17 Appendix 1 Map: C-4 Building Area: 559 SWMU Number: 121		DWGS 25609-X01 to -X03 DWGS 24386-1 to -2	DWG 15501-20	
Pipe Material:	Pyrex (glass)	Glass, glass/PVC, stainless steel	Polyethylene/PVC pipe between Bldg. 559 and Bldg. 528	Glass
Description of Pipe Section:		P-17-abandoned beneath slab		P-17 (outside of building)
Pipe Diameter (in.):	4	3,4,4" PVC inside 6" glass	4	4
Pipe Length (ft.):	1130		160	135
Line Volume (cubic feet):				
Date of Installation:	1968			1968
Date of Abandonment:	July 1982	After 7/2/76 (date of drawing)		
Age (Years):	14			
Disposition:	Abandoned	Abandoned; removed piping above floor slab		
Waste Streams:		Process waste from Bldg. 559	Process waste	B559-lab waste, activity is Pu
Reported Releases:	Yes @ P-17 under Bldg. 559			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipe Designation: P-18
Appendix 1 Map: C-4
Building Area: 561
SWMU Number: 121

Pipes	Reference: (1)	Reference: (4)	Reference: (3)	Reference: ( )
Pipe Material:	Rigid teflon	Rigid teflon	Rigid teflon	
Description of Pipe Section:		P-18		
Pipe Diameter (in.):	2.75	2.75	2.75	
Pipe Length (ft.):	150	150	55	
Line Volume (cubic feet):				
Date of Installation:	1968	1968		
Date of Abandonment:	July 1982			
Age (Years):	14			
Disposition:	Abandoned			
Waste Streams:		B559-lab waste, activity is Pu	Forced process waste	
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (4)
Pipe Designation: P-19 Appendix 1 Map: C-5,D-5 Building Area: 707 SWMU Number: 121			DWG 25788-X05 to -X07 15501-21	
Pipe Material:	Stainless steel		Stainless steel	Stainless steel
Description of Pipe Section:		Pipe A-12	Portion of P-19	E707 to N707
Pipe Diameter (in.):	3		3	3
Pipe Length (ft.):	603	154*	980	186
Line Volume (cubic feet):				
Date of Installation:	1968			1968
Date of Abandonment:	March 1984		After 12/7/77	
Age (Years):	16			
Disposition:	Abandoned	Abandoned	Removed P-19 outside of building going to T-11; abandoned all of P-19 inside bldg.	
Waste Streams:			Process waste	
Reported Releases:	None			
Comments:		*Does not include portion under Bldg. 707		

Original Process Waste Line
Data Summary Sheet

Pipes

Pipe Designation: P-20
Appendix 1 Map: B-5,C-5
Building Area: 777
SWMU Number: 121

	Reference: (1)	Reference: (2)	Reference: (3)	Reference: ( )
			DWG 25845-X125 -X085	
Pipe Material:	Stainless steel		Stainless steel	
Description of Pipe Section:		Portion of A-7 running N-S	P-20	
Pipe Diameter (in.):	3		3	
Pipe Length (ft.):	499	480	455	
Line Volume (cubic feet):				
Date of Installation:	1968		1968	
Date of Abandonment:	March 1984			
Age (Years):				
Disposition:	Abandoned	Abandoned		
Waste Streams:			Bldgs. 123,444,559, 707,865,883,889,881 and 729	
Reported Releases:	Yes-@ P-20,21, 25 and 34			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes

Pipe Designation: P-21
Appendix 1 Map: B-5
Building Area: 774
SWMU Number: 121

	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (3)
				DWG 15501-13
Pipe Material:	Stainless steel		Stainless steel	Stainless steel
Description of Pipe Section:		South 185' of F-2	N777 to Bldg. 774, enters west side	
Pipe Diameter (in.):	3		3	3
Pipe Length (ft.):	386	185		291
Line Volume (cubic feet):				
Date of Installation:	1952		1952	
Date of Abandonment:	March 1984			
Age (Years):	32			
Disposition:	Abandoned	"To be abandoned when system is upgraded to an inspectable system in the future."		
Waste Streams:			All buildings except B-771	Process waste
Reported Releases:	Yes-@ P-20, 21, 25 and 34			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipe Designation: P-22
Appendix 1 Map: B-5
Building Area: 771
SWMU Number: 121

Pipes	Reference: (1)	Reference: (3)	Reference: (4)	Reference: ( )
		DWGS 19602-1 to -3 15501-13		
Pipe Material:	Cast iron	Cast iron	Cast iron	
Description of Pipe Section:		Beneath Bldg. 771	Exists north of B-771 to 771 tanks	
Pipe Diameter (in.):	6	6	6	
Pipe Length (ft.):	1205	1335	85	
Line Volume (cubic feet):				
Date of Installation:	1966		1966	
Date of Abandonment:	May 1982			
Age (Years):	16			
Disposition:	Decontaminated, removed and replaced with inspectable pipe	Drawings dated 12/15/72 (as builts) indicate some lines had been removed		
Waste Streams:		Process waste	Janitor waste and decontaminated water prior to 1968, water was low-level RAD and was transferred directly to the solar ponds, activity is Pu	
Reported Releases:	Yes-@ intersection of P-22, P-23 and P-24; @ Tank T-8			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes

	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (3)
Pipe Designation: P-23				DWG 15501-12 & -13
Appendix 1 Map: B-4,B-5				
Building Area: 771				
SWMU Number: 121				
Pipe Material:	Fiberglass		Fiberglass	Fiberglass
Description of Pipe Section:		Pipe T-1	West of 771 to 771 tanks	West of Bldg. 771, North to Bldg. 728
Pipe Diameter (in.):	10		10	10
Pipe Length (ft.):	395	395	395	430
Line Volume (cubic feet):				
Date of Installation:	1969		1969	
Date of Abandonment:	May 1982			
Age (Years):	13			
Disposition:	Abandoned	Temp. in use, to be abandoned		
Waste Streams:			Janitor waste and decontaminated water prior to 1969, wastes were low-level and went to the solar ponds; activity is Pu.	Process waste
Reported Releases:	Yes-@ intersection of P-22 and P-23			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipe Designation: P-24
Appendix 1 Map: B-5
Building Area: 771
SWMU Number: 121

Pipes	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (3)
				DWG 15501-13
Pipe Material:	Cast iron		Cast iron	Cast iron
Description of Pipe Section:		Northern east-west section of T-2	P-24	
Pipe Diameter (in.):	6		6	6
Pipe Length (ft.):	306	290	180	290
Line Volume (cubic feet):				
Date of Installation:	1966		1966	
Date of Abandonment:	May 1982			
Age (Years):	16			
Disposition:	Abandoned	Temporarily in use; to be abandoned		
Waste Streams:			Janitor water and decontaminated water prior to 1969; at P-24 and P-25, a leak of 15 gal/hr at 20 psig in 1971; was low-level RAD and transferred directly to the solar ponds; activity is Pu	Process water
Reported Releases:	Yes-@ intersection of P-22, 24 and 25			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipe Designation: P-25
Appendix 1 Map: B-5
Building Area: 774
SWMU Number: 121

Pipes	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (8)
Pipe Material:	SS/CI/Steel		Stainless steel	
Description of Pipe Section:		Southern portion of T-2	P-25	Line between Bldgs. 771 and 774
Pipe Diameter (in.):	3		3	
Pipe Length (ft.):	562	575	516	
Line Volume (cubic feet):				
Date of Installation:	1972		1972	
Date of Abandonment:	May 1982			
Age (Years):	10			
Disposition:	Abandoned	Temporarily in use, to be abandoned		
Waste Streams:			Bldg. 777	Process waste
Reported Releases:	Yes-@ intersection of P-25 and P-28, P-35, 38, 43 & 44, also at P-21, P-24		Yes-@ P-24 & 25, a leak at rate of 15 gal/hr @ 20 psig, was found in 1971	Yes-@ P-24 & 25, a leak at rate of 15 gal/hr @ 20 psig, was found in 1977
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (3)	Reference: ( )	Reference: ( )	Reference: ( )
Pipe Designation: P-25 (cont)	DWG 15501-13			
Appendix 1 Map: B-5				
Building Area: 774				
SWMU Number: 121				
Pipe Material:	Cast iron and steel			
Description of Pipe Section:				
Pipe Diameter (in.):	3			
Pipe Length (ft.):	535			
Line Volume (cubic feet):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:				
Waste Streams:	Process waste - forced			
Reported Releases:				
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (3)
Pipe Designation: P-26 (two pipes)				DWG 15501-13
Appendix 1 Map: B-5,B-6				
Building Area: 774				
SWMU Number: 121				
Pipe Material:	Polyvinyl chloride		PVC	PVC
Description of Pipe Section:		Pipe A-10	Exists E774 to 207A	
Pipe Diameter (in.):	1.5 (each)		1.5 (each)	2-1 1/2" pipes
Pipe Length (ft.):	2750 (total)	635 (each)	1500 (total)	720 (each)
Line Volume (cubic feet):				
Date of Installation:	1972			
Date of Abandonment:	Late 1970s			
Age (Years):				
Disposition:	Abandoned	Abandoned		
Waste Streams:				Process waste and process waste return
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes		Reference: (6)	Reference: ( )	Reference: ( )	Reference: ( )
Pipe Designation:	P-26 (two pipes) cont.				
Appendix 1 Map:	B-5,B-6				
Building Area:	774				
SWMU Number:	121				
Pipe Material:					
Description of Pipe Section:		Line between B774 and solar ponds			
Pipe Diameter (in.):		3			
Pipe Length (ft.):					
Line Volume (cubic feet):					
Date of Installation:					
Date of Abandonment:					
Age (Years):					
Disposition:					
Waste Streams:		Process waste			
Reported Releases:		Leak of radioactive liquid process waste occurred 7/21/80			
Comments:					

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (4)
Pipe Designation: P-27 (two pipes)			DWG 15501-13	
Appendix 1 Map: B-5				
Building Area: 774				
SWMU Number: 121				
Pipe Material:	Stainless steel		Stainless steel	Stainless steel
Description of Pipe Section:		Pipes A-1 and F-1 and Part of F-2	P-27	
Pipe Diameter (in.):	3		3	
Pipe Length (ft.):	185 (each)	195 (each)	125 (each)	
Line Volume (cubic feet):				
Date of Installation:	1968			1968
Date of Abandonment:	Active			
Age (Years):				
Disposition:	Active	A-1 is abandoned, F-1 and F-2 are to be abandoned when system is upgraded to inspectable system in the future		
Waste Streams:			Process waste	Treated waste went to ponds
Reported Releases:	Yes-@ intersection P-27 and P-28			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (4)
Pipe Designation: P-28 (two pipes)			DWG 15501-13	
Appendix 1 Map: B-5				
Building Area: 774				
SWMU Number: 121				
Pipe Material:	Stainless steel		Stainless steel	Stainless steel
Description of Pipe Section:		Pipes A-1 and F-2		P-28
Pipe Diameter (in.):	3		3	3
Pipe Length (ft.):	111 (each)	115 (each)	130 (each)	111
Line Volume (cubic feet):				
Date of Installation:	1972			1972
Date of Abandonment:	Active			
Age (Years):				
Disposition:	Active	A-1 is abandoned, F-2 is to be abandoned when system is upgraded to inspectable system in the future		
Waste Streams:			Process waste	
Reported Releases:	Yes-@ intersection of P-28 with P-25 and P-27			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (5)	Reference: ( )	Reference: ( )	Reference: ( )
Pipe Designation:	P-28 (two pipes) (cont)			
Appendix 1 Map:	B-5			
Building Area:	774			
SWMU Number:	121			
Pipe Material:	Cast iron			
Description of Pipe Section:	P-28			
Pipe Diameter (in.):	3 and 4			
Pipe Length (ft.):				
Line Volume (cubic feet):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:				
Waste Streams:				
Reported Releases:	Yes-old cast iron lines between B774 and valve pit north of 207; 3" line leaked 14 gal/hr and 4" line leaked 45 gal/hr @ 20 psig. Both replaced in April 1972			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes

Pipe Designation: P-29
Appendix 1 Map: B-5
Building Area: 774
SWMU Number: 121

	Reference: (1)	Reference: (3)	Reference: ( )	Reference: ( )
		DWG 15501-13		
Pipe Material:	Stainless steel	Stainless steel		
Description of Pipe Section:				
Pipe Diameter (in.):	4	4		
Pipe Length (ft.):	197	505		
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:	Active			
Age (Years):				
Disposition:	Active			
Waste Streams:		Process waste		
Reported Releases:	None			
Comments:		Bldg. 774 to solar pond 207C		

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: ( )
Pipe Designation: P-30			DWG25845-X06S & X07S	
Appendix 1 Map: B-5,C-5				
Building Area: 777				
SWMU Number: 121				
Pipe Material:	Steel			
Description of Pipe Section:		Pipe A-7	Pipe P-30	
Pipe Diameter (in.):	4		2, 3, 4, 6	
Pipe Length (ft.):	667	70*	1,377	
Line Volume (cubic feet):				
Date of Installation:	1957			
Date of Abandonment:	October 1982			
Age (Years):	25			
Disposition:	Decontaminated removed and replaced with inspectable pipe	Abandoned	Abandoned after 12-15-77	
Waste Streams:			Process waste	
Reported Releases:	None			
Comments:		*Does not include pipe length beneath building 776		

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (3)	Reference: ( )	Reference: ( )
Pipe Designation: P-31 Appendix 1 Map: B-5 Building Area: 771 - 774 SWMU Number: 121		DWG 26629-1		
Pipe Material:	Steel			
Description of Pipe Section:		P-31 located in pipe tunnel between B771 & B774		
Pipe Diameter (in.):	1	1, 4		
Pipe Length (ft.):	167			
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:	1972			
Age (Years):	20			
Disposition:	Abandoned	DWGS indicate work to be done to remove the pipes in the tunnel		
Waste Streams:		Process waste		
Reported Releases:	None			
Comments:		Pipe tunnel has been contaminated		

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (4)
Pipe Designation: P-32			DWA 25845-X05S	
Appendix 1 Map: B-5,C-5			-X065 & -X12S	
Building Area: 777				
SWMU Number: 121				
Pipe Material:	VCP/Steel/VCP		Steel/cast iron	Cast iron
Description of Pipe Section:		Pipe A-8	P-30	Existing N776 to 776 tanks
Pipe Diameter (in.):	6		4, 6	6
Pipe Length (ft.):	907	70*	535	72
Line Volume (cubic feet):				
Date of Installation:	1957			
Date of Abandonment:	Dec. 1982			
Age (Years):	25			
Disposition:	Decontaminated, removed and replaced with inspectable pipe.	Abandoned	Portion Abandoned After 12-15-77	
Waste Streams:			Laundry waste	Prior to 1969 was WW-level waste transferred to solar ponds; subsequent high plutonium waste
Reported Releases:	None			
Comments:		* Does not include portion beneath Bldg. 776.		

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (3)	Reference: ( )	Reference: ( )
Pipe Designation: P-33		DWG 15501-13		
Appendix 1 Map: B-5				
Building Area: 771 - 774				
SWMU Number: 121				
Pipe Material:	Steel	Steel		
Description of Pipe Section:				
	3	3		
Pipe Diameter (in.):	142	160		
Pipe Length (ft.):				
Line Volume (cubic feet):				
Date of Installation:	1966			
Date of Abandonment:	1972			
Age (Years):	6			
Disposition:	Abandoned	Abandoned		
Waste Streams:		Process waste		
Reported Releases:	None			
Comments.				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: ( )
Pipe Designation: P-34			DWG 15501-13	
Appendix 1 Map: B-5				
Building Area: 774				
SWMU Number: 121				
Pipe Material:	Stainless steel		Steel	
Description of Pipe Section:		Pipe F-2		
Pipe Diameter (in.):	3		3	
Pipe Length (ft.):	127	130	305	
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:	March 1984			
Age (Years):	32			
Disposition:	Abandoned	To be abandoned when system is upgraded to an inspectable system in the future	Abandoned	
Waste Streams:			Process waste	
Reported Releases:	Yes-@ intersection of P-33 and P-21			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes

	Reference: (1)	Reference: (2)	R3eference: (3)	Reference: ( )
			DWG 15501-13	
Pipe Designation: P-35				
Appendix 1 Map: B-5				
Building Area: Pond 207				
SWMU Number: 121				
Pipe Material:	Steel		Steel	
Description of Pipe Section:	(one pipe)	Pipe A-2 or A-3 (two pipes)	3-ID-STL 3-PW-STL (two pipes)	
Pipe Diameter (in.):	3		3	
Pipe Length (ft.):	144	135		
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:	Active			
Age (Years):				
Disposition:	Active	Abandoned		
Waste Streams:			Process waste	
Reported Releases:	Yes-@ intersection of P-35 and P-25			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	R3eference: (3)	Reference: ( )
Pipe Designation: P-35			DWG 15501-13	
Appendix 1 Map: B-5				
Building Area: Pond 207				
SWMU Number: 121				
Pipe Material:	Steel		Steel	
Description of Pipe Section:		Pipe A-2 or A-3	3-ID-STL	
	(one pipe)	(two pipes)	3-PW-STL	
			(two pipes)	
Pipe Diameter (in.):	3		3	
Pipe Length (ft.):	144	135		
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:	Active			
Age (Years):				
Disposition:	Active	Abandoned		
Waste Streams:			Process waste	
Reported Releases:	Yes-@ intersection of P-35 and P-25			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipe Designation: P-36
Appendix 1 Map: B-5,B-6
Building Area: Pond 207
SWMU Number: 121

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: ( )
			DWG 15501-13	
Pipe Material:	Stainless steel/PVC		PVC	
Description of Pipe Section:		Pipe F-3		
Pipe Diameter (in.):	3		3	
Pipe Length (ft.):	599	530		
Line Volume (cubic feet):				
Date of Installation:	1965			
Date of Abandonment:	December 1982			
Age (Years):				
Disposition:	Abandoned	To be abandoned when system is upgraded to an inspectable system in the future		
Waste Streams:				
Reported Releases:	Yes-@ intersection of P-36 with P-20, P-37, P-41 through P-44			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (3)
Pipe Designation: P-37			DWG 25845-X12S	DWG15501-22
Appendix 1 Map: B-5,B-6,C-6				
Building Area: 730 - Pond 207				
SWMU Number: 121				
Pipe Material:	Steel/PVC/VCP			Stainless steel
Description of Pipe Section:		Pipes A-5, A-11 and T-6	Pipe 37, east/west pipe between B777 and B702	
Pipe Diameter (in.):	3		3	2-3"
Pipe Length (ft.):	1449	1500		
Line Volume (cubic feet):				
Date of Installation:	1957			
Date of Abandonment:	December 1982			
Age (Years):	25			
Disposition:	Abandoned	Abandoned A-5 and A-11, T-6 temporarily in use to be abandoned	Abandoned portion immediately adjacent to P-41 after 12/15/77	
Waste Streams:			Process waste	Brine
Reported Releases:	Yes-@ intersection of P-37 with P-20, P-36 and P-38			
Comments:			DWG 25845-X12S does not show extension to solar pond 207A	Notes from Murray Maas indicate 3" stainless steel pipe used for return from R.O. to solar ponds

Original Process Waste Line
Data Summary Sheet

Pipe Designation: P-37 (cont)
Appendix 1 Map: B-5,B-6,C-6
Building Area: Pond 207
SWMU Number: 121

Pipes	Reference: (4)	Reference: (4)	Reference: ( )	Reference: ( )
Pipe Material:	Steel	Stainless steel		
Description of Pipe Section:	776 tanks to ponds	776 tanks to valve pit north of tank 207		
Pipe Diameter (in.):	3	3		
Pipe Length (ft.):	1055	402		
Line Volume (cubic feet):				
Date of Installation:	1957	1957		
Date of Abandonment:				
Age (Years):				
Disposition:				
Waste Streams:	Process waste and process waste supply	High volume-high activity (plutonium)		
Reported Releases:				
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (3)
Pipe Designation: P-38				DWG 15501-22
Appendix 1 Map: B-5,B-6,C-6				
Building Area: Pond 207				
SWMU Number: 121				
Pipe Material:	Vitrified clay/PVC		VCP	VCP/PVC
Description of Pipe Section:		Pipes A-4 and T-5	Valve pit northeast of 207 to off site	
Pipe Diameter (in.):	10		10	10
Pipe Length (ft.):	800	700	660	730
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:	December 1982			
Age (Years):	30			
Disposition:	Abandoned	A-4 is abandoned, T-5 is to be abandoned		
Waste Streams:				Process waste
Reported Releases:	Yes-@ intersection of P-38 with P-25 and P-37			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipe Designation: P-39
Appendix 1 Map: C-6,C-7,C-8
Building Area: 988 - Pond 207
SWMU Number: 121

Pipes	Reference: (1)	Reference: (2)	Reference: (4)	Reference: ( )
Pipe Material:	Vitrified clay		Vitrified clay	
Description of Pipe Section:		Pipes T-5, A-27 and A-28	Valve pit northeast of 207 to off site	
Pipe Diameter (in.):	6		6	
Pipe Length (ft.):	1817	2020	2190	
Line Volume (cubic feet):				
Date of Installation:	1957			
Date of Abandonment:	December 1982			
Age (Years):	25			
Disposition:	Abandoned	T-5 is temporarily in use, to be abandoned; A-27 and A-28 are abandoned		
Waste Streams:				
Reported Releases:	Yes-@ P-39 east end of pipe			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (4)
Pipe Designation: P-40			DWG 15501-23	
Appendix 1 Map: C-7,C-8				
Building Area: Pond B-2				
SWMU Number: 121				
Pipe Material:	Fiberglass		Fiberglass	
Description of Pipe Section:		Pipe T-5		Portion of line under perimeter road to Pond B-2
Pipe Diameter (in.):	6		6	
Pipe Length (ft.):	229	1617		
Line Volume (cubic feet):				
Date of Installation:	1972			
Date of Abandonment:	December 1982			
Age (Years):	10			
Disposition:	Abandoned	Temporarily in use-to be abandoned		
Waste Streams:			Process waste to Pond B-2	
Reported Releases:	None			Small leak resulting from cable laying operation; line replaced
Comments:			Pipe extending to Bldg. 990 and T-31 indicated by Murray Maas; abandoned in place 1973	

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (4)
Pipe Designation: P-41 Appendix 1 Map: B-5,C-5,C-6 Building Area: 779 SWMU Number: 121			DWGS 25845-X-09S, -X10S & -X12S and 15501-13 & -21	
Pipe Material:	Vitrified clay		VCP, black iron and stainless steel	Stainless steel
Description of Pipe Section:		Pipes T-4 and A-6	P-41	Existed west side of B779 to valve pit N77
Pipe Diameter (in.):	3		2 & 3	3
Pipe Length (ft.):	1537	495*	2120	164
Line Volume (cubic feet):				
Date of Installation:	1957			1957
Date of Abandonment:	December 1982			
Age (Years):	25			
Disposition:	Abandoned	T-4 is temporarily in use, to be abandoned; A-6 is abandoned	Abandoned after 12/15/77	
Waste Streams:			Process waste and plate process waste	
Reported Releases:	Yes-@ intersection of P-41 with P-20 and P-36			
Comments:		*Does not include portion beneath building		

Original Process Waste Line
Data Summary Sheet

Pipe Designation: P-42
Appendix 1 Map: B-5,C-5
Building Area: 779
SWMU Number: 121

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (4)
			DWG 25845-X09S, -X10S and X12S and 15501-13	
Pipe Material:	Cast iron		Stainless steel	Stainless steel
Description of Pipe Section:		Pipe A-6	P-42	Exits west side of B779 to valve pit N77
Pipe Diameter (in.):	3		3	3
Pipe Length (ft.):	213	204*	280	164
Line Volume (cubic feet):				
Date of Installation:	1957			
Date of Abandonment:	December 1982			1957
Age (Years):				
Disposition:	Decontaminated, removed and replaced with inspectable pipe	Abandoned	Abandoned after 12/15/77	
Waste Streams:			Process waste	
Reported Releases:	Yes-@ intersection of P-42 with P-36			
Comments:		*Does not include portion beneath building	Terminal end beneath Bldg. 779 plugged per detail "X01" DWG 25845-X05	

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: ( )
Pipe Designation: P-43			DWG 25845-X12S &	
Appendix 1 Map: B-5			DWG 15501-13	
Building Area: 703				
SWMU Number: 121				
Pipe Material:	Steel		Steel	
Description of Pipe Section:		Pipe T-4	East of Bldg. 703	
Pipe Diameter (in.):	3		3	
Pipe Length (ft.):	103	90	105	
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:	December 1982			
Age (Years):	30			
Disposition:	Abandoned	Temporarily in use; to be abandoned		
Waste Streams:				
Reported Releases:	Yes-@ intersection of P-43 with P-25 and P-36			
Comments:			DWG -X12S indicates to be abandoned after 12/15/77	

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (1)	Reference: (2)	Reference: (3)	Reference: ( )
Pipe Designation: P-44			DWG 25845-X12S &	
Appendix 1 Map: B-5			DWG 15501-13	
Building Area: 703				
SWMU Number: 121				
Pipe Material:	Steel			
Description of Pipe Section:		Pipe F-4	East of Bldg. 203	
Pipe Diameter (in.):	3			
Pipe Length (ft.):	92	70	75	
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:	December 1982			
Age (Years):	30			
Disposition:	Abandoned	To be abandoned when system is upgraded to an inspectable system in the future		
Waste Streams:				
Reported Releases:	Yes-@ intersection of P-44 with P-25 and P-36			
Comments:			DWG -X12S indicates line to be abandoned 12/15/77	

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (2)	Reference: ( )	Reference: ( )	Reference: ( )
Pipe Designation: P-45				
Appendix 1 Map: B-5				
Building Area: Tank 207				
SWMU Number: 121				
Pipe Material:				
Description of Pipe Section:	Pipe T-3 south of tank 207			
Pipe Diameter (in.):				
Pipe Length (ft.):	125			
Line Volume (cubic feet):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:	Temporarily in use; to be abandoned			
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (2)	Reference: (3)	Reference: ( )	Reference: ( )
Pipe Designation: P-46		DWG 15501-13		
Appendix 1 Map: B-5				
Building Area: Tank 207				
SWMU Number: 121				
Pipe Material:		Steel		
Description of Pipe Section:	Pipe A-2 or A-3 north of Tank 207			
Pipe Diameter (in.):		3		
Pipe Length (ft.):	135	140		
Line Volume (cubic feet):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:	Abandoned			
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (2)	Reference: (3)	Reference: ( )	Reference: ( )
Pipe Designation: P-47		DWG 15501-14		
Appendix 1 Map: B-6				
Building Area: Ponds 207				
SWMU Number: 121				
Pipe Material:		Cement-asbestos		
Description of Pipe Section:	Pipe T-7 between ponds 207-C and 207-A			
Pipe Diameter (in.):		3		
Pipe Length (ft.):	125	130		
Line Volume (cubic feet):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:	Temporarily in use; to be abandoned			
Waste Streams:				
Reported Releases:	None			
Comments:		DWG indicates secondary reverse osmosis pipe		

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (2)	Reference: (3)	Reference: ( )	Reference: ( )
Pipe Designation: P-48 Appendix 1 Map: B-6 Building Area: Ponds 207 SWMU Number: 121		DWG 15501-14		
Pipe Material:				
Description of Pipe Section:	Pipe F-5 between ponds 207-C and 207-A			
Pipe Diameter (in.):				
Pipe Length (ft.):	193	210		
Line Volume (cubic feet):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:	To be abandoned when system is upgraded to an inspectable system in the future			
Waste Streams:		Process waste		
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (2)	Reference: (3)	Reference: ( )	Reference: ( )
Pipe Designation: P-49		DWG 15501-14		
Appendix 1 Map: B-6				
Building Area: Ponds 207				
SWMU Number: 121				
Pipe Material:		Cast iron		
Description of Pipe Section:	Pipe F-6 between ponds 207-C and 207-A			
Pipe Diameter (in.):		8		
Pipe Length (ft.):	85	85		
Line Volume (cubic feet):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:	To be abandoned when system is upgraded to an inspectable system in the future			
Waste Streams:		Process waste (Pond 207A) and forced process waste (Pond 207C)		
Reported Releases:				
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (2)	Reference: (3)	Reference: ( )	Reference: ( )
Pipe Designation: P-50		DWG 15501-14		
Appendix 1 Map: B-6				
Building Area: Ponds 207				
SWMU Number: 121				
Pipe Material:				
Description of Pipe Section:	Pipe F-7 between ponds 207-A and 207-B north	Pipe between pond 207-A and 207-B north		
Pipe Diameter (in.):		8		
Pipe Length (ft.):	105	85		
Line Volume (cubic feet):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:	To be abandoned when system is upgraded to an inspectable system in the future			
Waste Streams:		Process waste (pond 207B north) and forced process waste (pond 207A)		
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: ( )	Reference: (3)	Reference: ( )	Reference: ( )
Pipe Designation: P-51 Appendix 1 Map: C-5 Building Area: 778 SWMU Number: 121		DWG 25845-X16 & DWG 25845-X05S		
Pipe Material:		Black iron		
Description of Pipe Section:		Beneath Bldg. 778		
Pipe Diameter (in.):		4,6		
Pipe Length (ft.):		170		
Line Volume (cubic feet):				
Date of Installation:		1957		
Date of Abandonment:		1978		
Age (Years):		21		
Disposition:		Abandoned after 5/11/78 (portion above floor slab was removed)		
Waste Streams:		Laundry waste		
Reported Releases:		None		
Comments:		Drains and wall pen. plugged with expansive cement		

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (3)	Reference: (3)	Reference: ( )	Reference: ( )
Pipe Designation: P-52 Appendix 1 Map: E-3 Building Area: 443 SMWU Number: 121	DWGS 25838-DX1, and -D01 to -D05	DWG 25838-X04		
Pipe Material:				
Description of Pipe Section:	Beneath Bldg. 443			
Pipe Diameter (in.):		4		
Pipe Length (ft.):	280	15		
Line Volume (cubic feet):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:	DWGS indicate pipes were decontaminated and abandoned in place or removed after 8/10/78	DWG indicates F.D. plugged and abandoned in place		
Waste Streams:	Process waste	Process waste		
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipe Designation: P-53
Appendix 1 Map: F-5
Building Area: 881
SWMU Number: 121

Pipes	Reference: (4)	Reference: (3)	Reference: ( )	Reference: ( )
		DWG 15501-54		
Pipe Material:	Stainless steel	Steel		
Description of Pipe Section:	Exits south side of B881; connects to 81 and 87			
Pipe Diameter (in.):	2	2		
Pipe Length (ft.):	78			
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:				
Age (Years):				
Disposition:	Abandoned under authorization #365556			
Waste Streams:	Laundry waste, process and lab waste, caustic 95% enriched uranium-235 from Bldg. 881	Nitrate drain		
Reported Releases:				
Comments:	DWG 15507-4 Detail 1			

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (4)	Reference: ( )	Reference: ( )	Reference: ( )
Pipe Designation: P-54				
Appendix 1 Map: F-5				
Building Area: 881				
SWMU Number: 121				
Pipe Material:	Stainless steel			
Description of Pipe Section:	Exits south side of B881, connects 81 and 87			
Pipe Diameter (in.):	3			
Pipe Length (ft.):	140			
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:				
Age (Years):				
Disposition:	To be double contained, authorization #365556			
Waste Streams:	Laundry waste; process and lab waste; caustics, 95% enriched U-235 from Bldg. 881			
Reported Releases:				
Comments:	DWG 15507-1 Detail 1			

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (4)	Reference: ( )	Reference: ( )	Reference: ( )
Pipe Designation: P-55				
Appendix 1 Map: F-5				
Building Area: 881				
SWMU Number: 121				
Pipe Material:	Stainless steel			
Description of Pipe Section:	Exits south side of B881, connects 81 and 87			
Pipe Diameter (in.):	4			
Pipe Length (ft.):	158			
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:				
Age (Years):				
Disposition:				
Waste Streams:	Decontamination water contains both uranium and plutonium from Bldg. 889			
Reported Releases:				
Comments:	DWG 15507-1 Detail 1			

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (4)	Reference: ( )	Reference: ( )	Reference: ( )
Pipe Designation: P-56 (five pipes)				
Appendix 1 Map: B-5				
Building Area: 771, 774				
SWMU Number: 121				
Pipe Material:	Plastic hoses			
Description of Pipe Section:	Tunnel between B771 and B774			
Pipe Diameter (in.):	3-1", 2-2"			
Pipe Length (ft.):	167 (each)			
Line Volume (cubic feet):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:				
Waste Streams:	Janitor waste and decontamination water with plutonium; prior to 1969 waste was low level and transferred directly to ponds.			
Reported Releases:	None; lines were in a tunnel, thus doubly contained and inspectable			
Comments:				

Original Process Waste Line
Data Summary Sheet

Pipes	Reference: (4)	Reference: ( )	Reference: ( )	Reference: ( )
Pipe Designation: P-57				
Appendix 1 Map: E-2				
Building Area: 122, 123				
SWMU Number: 121				
Pipe Material:	Cast iron			
Description of Pipe Section:	Line between 122 and 123			
Pipe Diameter (in.):	4			
Pipe Length (ft.):	20			
Line Volume (cubic feet):				
Date of Installation:	1952			
Date of Abandonment:				
Age (Years):				
Disposition:				
Waste Streams:				
Reported Releases:	Yes-2.5 gal/hr @ 37 psig			
Comments:				

2.2 TANKS

ORIGINAL PROCESS WASTE LINES

TANKS

SUMMARY DATA SHEETS

REFERENCES

(1) ORIGINAL PROCESS WASTE LINE CLOSURE PLAN, Appendix A-5 of the Post-Closure Care Permit Application, November 26, 1986, Revision 0

(2) CONCEPTUAL DESIGN REPORT, ENVIRONMENTAL IMPROVEMENT PROJECTS, Rockwell International, Rocky Flats Plant, Golden Colorado, December, 1985.

(3) ROCKWELL INTERNATIONAL DRAWINGS, Specific drawings are indicated at each reference note

(4) SURVEY OF THE STATUS OF THE EXISTING PROCESS WASTE LINES, Sunday, G , Rockwell International, September, 1976, (unnumbered report)

(5) UNDERGROUND STORAGE TANK REPORT, Rockwell International, May 1986

(6) TANK LIST, Rockwell International, Mr Bob James, 1988

(7) RCRA Part B Operating Permit Application, U.S DOE Rocky Flats Plant, Hazardous and Radioactive Mixed Wastes, 15 December 1987, Revision No 1, C07890010526

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-1
Appendix 1 Map: E-2
Rocky Flats Number: 77
SWMU Number: 121
Building Number: 122

Tanks	Reference: (1)	Reference: (4)	Reference: (5)	Reference: (6)
Number of Tanks:	1	1	1	1
Tank Material:	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Description of Tank:	AG-1 (above grade)	Underground		
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	800	800	800	800
Date of Installation:				1955
Date of Abandonment:	January 1984		January 1984	January 1984
Age (Years):	33	33		29
Disposition:	Removed		Removed	Removed
Waste Streams:				
Reported Releases:	Yes - @ T-1			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-2
Appendix 1 Map: E-2
Rocky Flats Number: 36
SWMU Number: 121
Building Number: 441

Tanks	Reference: (1)	Reference: (5)	Reference: (6)	Reference: ( )
Number of Tanks:	1	1	1	
Tank Material:	Concrete	Concrete	Concrete	
Description of Tank:	SU/UG (open/closed top sump/underground)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	3000	3000	3000	
Date of Installation:			1953	
Date of Abandonment:	June 1982	June 1982	June 1982	
Age (Years):	36	36	35	
Disposition:	Active-converted to the new process waste or the fire water deluge collection systems	Active	Converted to plenum deluge	
Waste Streams:		Rad., Bldg. 123 process wastes		
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-3
Appendix 1 Map: E-2
Rocky Flats Number: 78
SWMU Number. 121
Building Number: 429

	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (6)
Number of Tanks:	1	1	1	1
Tank Material:	Concrete			Concrete
Description of Tank:	UG (underground)	Buried; Tank T-F	South of Building 441	
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	3000	3000	3000	3000
Date of Installation:				1952
Date of Abandonment:	June 1982			
Age (Years):	36		36	
Disposition:	Abandoned	To be removed		Old process waste tank currently under closure
Waste Streams:			Process wastes from Bldg. 123	
Reported Releases:	Yes - @ T-3 and P-4			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-4
Appendix 1 Map: F-3
Rocky Flats Number: 79,80
SWMU Number: 121
Building Number: 447

Tanks	Reference: (1)	Reference: (5)	Reference: (6)	Reference: ( )
Number of Tanks:	2	2	2	
Tank Material:	Concrete		Concrete	
Description of Tank:	SU (open top sump)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):				
Date of Installation:			1962	
Date of Abandonment:	April 1982	April 1982		
Age (Years):	26			
Disposition:	Abandoned	Abandoned, cleaned and painted in April 1982	Old process waste tank currently under closure	
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks	Reference: (1)	Reference: (4)	Reference: (5)	Reference: (3)
				DWG 25838-D03
Tank Designation: T-5				
Appendix 1 Map: E-3				
Rocky Flats Number: 81-85				
SWMU Number: 121				
Building Number: 444				
Number of Tanks.	5	2	5	2
Tank Material:	Steel	Steel		Steel
Description of Tank:	AG-2 (aboveground in depressed sump)	Aboveground		
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	4000	3500 (7.5'x12.5')		2-4000
Date of Installation:				
Date of Abandonment:	April 1981		April 1981	
Age (Years):	36	36		
Disposition:	Active-converted to the new process waste or the fire water deluge collection systems	To be doubly contained, Auth. #385050	Active	Flush, clean, seal and abandon all PW underfloor and underground piping, convert tanks to new PW system
Waste Streams:				Process waste
Reported Releases:	None			
Comments:				To be abandoned after dwg date 8/10/78

Original Process Waste Line
Data Summary Sheet

Tanks

	Reference: (6)	Reference: ( )	Reference: ( )	Reference: ( )
Tank Designation: T-5 (cont)				
Appendix 1 Map: E-3				
Rocky Flats Number: 81-85				
SWMU Number: 121				
Building Number: 444				
Number of Tanks:	5			
Tank Material:	Steel			
Description of Tank:				
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	4000			
Date of Installation:	1952			
Date of Abandonment:				
Age (Years):				
Disposition:	Old process waste tank currently under closure			
Waste Streams.				
Reported Releases:				
Comments:				

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-6
Appendix 1 Map: E-3
Rocky Flats Number: 86,87
SWMU Number: 121
Building Number: 444

Tanks	Reference: (1)	Reference: (4)	Reference: (5)	Reference: (6)
Number of Tanks:	2	2	4	2
Tank Material:	Concrete	Concrete w/floor drain		Concrete
Description of Tank:	UG (underground)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	400	500	500 to 3500	400
Date of Installation:				1952
Date of Abandonment:	April 1981		April 1981	
Age (Years):	36	36	36	
Disposition:	Active-converted to the new process waste or the fire water deluge collection systems	To be made doubly contained Auth. #385050	Active-cleaned and painted in Arpil 1981	Old process waste tank currently under closure
Waste Streams:			Rad.	
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-7
Appendix 1 Map: C-4
Rocky Flats Number: 88
SWMU Number: 121
Building Number: 528

Tanks	Reference: (1)	Reference: (3)	Reference: (6)	Reference: ( )
Number of Tanks:	1		1	
Tank Material:	Concrete		Concrete	
Description of Tank:	AG2 (above grade in depressed sump)	Buried		
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):				
Date of Installation:				
Date of Abandonment:	July 1982			
Age (Years):				
Disposition:	Abandoned	Removed piping inside tank after 6/17/76	Old process waste tank currently under closure	
Waste Streams:				
Reported Releases:	Yes - @ Intersection of T-7 and P-16			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-8
Appendix 1 Map: B-5
Rocky Flats Number: 38,39
SWMU Number: 150.1
Building Number: 728

	Reference: (1)	Reference: (2)	Reference: (5)	Reference: (6)
Number of Tanks:	2	2	2	2
Tank Material:	Concrete		Concrete	Concrete
Description of Tank:	SU (open top sump)	TA-4, Buried		Underground
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	25,000	23,000	20,000	25,000
Date of Installation:				
Date of Abandonment:	May 1984		May 1984	
Age (Years):	36		36	
Disposition:	Active-converted to the new process waste system or the firewater deluge collection system	To be decontaminated and converted to fire water system	Active-catch for plenum deluge water	Converted to plenum deluge
Waste Streams:			Rad.	
Reported Releases:	Yes - @ intersection of T-8 with P-22, P-23 and P-24			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks	Reference: (1)	Reference: (2)	Reference: (3)	Reference: (4)
Tank Designation: T-9			DWG 25845-X06S	
Appendix 1 Map: B-5				
Rocky Flats Number: 40,41				
SWMU Number: 118.1				
Building Number: 730				
Number of Tanks:	2	2	2	2
Tank Material:	Concrete			Concrete
Description of Tank:	SU (open top sump)	Tank T-E, Buried		Buried 26 feet deep N. of Bldg. 776
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	22,500	22,500	22,500 (25'x15'x10')	
Date of Installation:				
Date of Abandonment:	October 1984			
Age (Years):	33			33
Disposition:	Active-converted to the new process waste system or the firewater deluge collection system	To be decontaminated and used for fire water retention	To be decontaminated and abandoned or converted to two-stage plenum fire water storage.	
Waste Streams:			Laundry waste and process waste	
Reported Releases:	None			
Comments:				

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Original Process Waste Line
Data Summary Sheet

Tank Designation: T-9 (continued)
Appendix 1 Map: B-5
Rocky Flats Number: 40,41
SWMU Number: 118.1
Building Number. 730

Tanks	Reference: (5)	Reference: (6)	Reference: ( )	Reference: ( )
Number of Tanks:	2	2		
Tank Material:	Concrete	Concrete		
Description of Tank:		Underground		
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	22,500	22,500		
Date of Installation:				
Date of Abandonment:	October 1984			
Age (Years):	33			
Disposition:	Active, catch for plenum deluge water	Converted to plenum deluge		
Waste Streams:	Rad.			
Reported Releases:				
Comments:		Currently under RCRA closure		

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-10
Appendix 1 Map: B-5
Rocky Flats Number: 42,43
SWMU Number: 139.1
Building Number: 730

	Reference: (1)	Reference: (2)	Reference: (3) DWG:	Reference: (4)
Number of Tanks:	2	2		2
Tank Material:	Concrete			Concrete
Description of Tank:	UG (underground)	Tank T-E, buried		Buried 26 ft. deep N. of Bldg. 776
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	4,500	4,500		4,500 (5'x5'x10')
Date of Installation:				
Date of Abandonment:	December 1982			
Age (Years):	33			33
Disposition:	Abandoned	To be decontaminated and used for fire water retention	To be decontaminated and abandoned or used for fire water retention	
Waste Streams:			Laundry waste or process waste	
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks		Reference: (6)	Reference: ( )	Reference: ( )	Reference: ( )
Tank Designation:	T-10 (cont)				
Appendix 1 Map:	B-5				
Rocky Flats Number:	42,43				
SWMU Number:	139.1				
Building Area:	730				
Number of Tanks:		2			
Tank Material:		Concrete			
Description of Tank:		Underground			
Tank Diameter (in.):					
Tank Height (ft.):					
Tank Volume (gallons):		4,500			
Date of Installation:					
Date of Abandonment:					
Age (Years):					
Disposition:					
Waste Streams:		Contents: radio-nuclides			
Reported Releases:					
Comments:					

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-11
Appendix 1 Map: C-5
Rocky Flats Number: 45,46
SWMU Number: 121
Building Number: 731

	Reference: (1)	Reference: (4)	Reference: (5)	Reference: (3)
				DWG 25788-X12
Number of Tanks:	2	2	2	2
Tank Material:	Concrete	Fiberglass	Concrete	Manufactured tanks
Description of Tank:	SU/UG (open/closed top sump/underground)	Buried 20 ft. deep E. of Bldg. 707		in below grade concrete vault.
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	2,000	3,000	2,000	
Date of Installation:				
Date of Abandonment:	July 1982		July 1982	Active after drawing date of 12/7/77
Age (Years):	29	15	29	
Disposition:	Active-converted to the new process waste system or the firewater deluge collection system	These tanks were placed inside the old concrete tanks in 1974	Active-became secondary containment	
Waste Streams:				Existing process waste transfer tanks
Reported Releases:	Yes - @ Tank T-11			
Comments:				Tanks appear to be fiberglass

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-11 (cont)
Appendix 1 Map: C-5
Rocky Flats Number: 45,46
SWMU Number: 121
Building Area: 731

Tanks	Reference: (6)	Reference: (7)	Reference: ( )	Reference: ( )
Number of Tanks:	2	1		
Tank Material:	Concrete	Concrete		
Description of Tank:		Secondary containment for process waste		
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	2000	23113 25.8' X 12' X 10'		
Date of Installation:	1960			
Date of Abandonment:	July 1982			
Age (Years):	28			
Disposition:				
Waste Streams:	Contents: double containment	Laundry room waste		
Reported Releases:				
Comments:		Part B Secondary containment Reference 2011		

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-12
Appendix 1 Map: B-5
Rocky Flats Number: 89,90
SWMU Number: 121
Building Number: 771

Tanks	Reference: (1)	Reference: (6)	Reference: ( )	Reference: ( )
Number of Tanks:	2	2		
Tank Material:	Concrete	Concrete		
Description of Tank:	UG (underground)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	20,000	20,000		
Date of Installation:		1952		
Date of Abandonment:	May 1984			
Age (Years):	36			
Disposition:	Abandoned	Old process waste tank currently under closure		
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-13
Appendix 1 Map: B-5
Rocky Flats Number: 91
SWMU Number: 121
Building Number: 774

	Reference: (1)	Reference: (2)	Reference: (6)	Reference: ( )
Number of Tanks:	1	1	1	
Tank Material:	Concrete		Concrete	
Description of Tank:	SU (open top sump)	Tank T-B Underground		
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	Approx. 600	7,000	600	
Date of Installation:			1952	
Date of Abandonment:	1972			
Age (Years):	36			
Disposition:	Abandoned	To be removed	Old process waste tank currently under closure	
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-14
Appendix 1 Map: B-5
Rocky Flats Number: 50
SWMU Number: 121
Building Number: 774

	Reference: (1)	Reference: (4)	Reference: (5)	Reference: (3) DWG 26629-1
Number of Tanks:	1	1	1	1
Tank Material:	Concrete			
Description of Tank:	UG (underground)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	30,000	30,000	33,000	30,000
Date of Installation:				
Date of Abandonment:	July 1982		July 1982	
Age (Years):	36			
Disposition:	Filled with gravel and capped		Filled with gravel and capped	
Waste Streams:				
Reported Releases:	Yes - @ in area of of tanks T-14, T-15 T-16 and T-17			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

	Reference: (6)	Reference: ( )	Reference: ( )	Reference: ( )
Tank Designation: T-14 (cont)				
Appendix 1 Map: B-5				
Rocky Flats Number: 50				
SWMU Number: 121				
Building Area: 774				
Number of Tanks:	1			
Tank Material:	Concrete			
Description of Tank:				
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	30,000			
Date of Installation:	1953			
Date of Abandonment:				
Age (Years):				
Disposition:	Gravel filled with concrete cap 7/82			
Waste Streams:	Contents: radio-nuclides			
Reported Releases:				
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks	Reference: (1)	Reference: (3)	Reference: (6)	Reference: ( )
Tank Designation: T-15		DWG 26629		
Appendix 1 Map: B-5				
Rocky Flats Number: 92,93				
SWMU Number: 121				
Building Number: 774				
Number of Tanks:	2	2	2	
Tank Material:	Concrete		Concrete	
Description of Tank:	UG (underground)	Horizontal cylindrical tanks		
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	3,750			
Date of Installation:			1969	
Date of Abandonment:	1970		1970	
Age (Years):	36		19	
Disposition:	Removed		Removed	
Waste Streams:				
Reported Releases:	Yes - in area of tanks T-14, T-15, T-16 and T-17			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-16
Appendix 1 Map: B-5
Rocky Flats Number: 94,95
SWMU Number: 121
Building Number: 774

Tanks	Reference: (1)	Reference: (2)	Reference: (4)	Reference: (5)
Number of Tanks:	2	2	2	2
Tank Material:	Concrete			
Description of Tank:	UG (underground)	Tank T-C, Buried		
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	14,000	14,000 (each)	14,000	14,000
Date of Installation:				
Date of Abandonment:	1970			
Age (Years):	36			
Disposition:	Abandoned	To be removed after inspectable system is installed		
Waste Streams:				
Reported Releases:	Yes - in area of tanks T-14, T-15, T-16 and T-17			
Comments:		In Ref. 2, tank T-C also includes 1-3000 gal. buried tank		

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-16 cont DWG 26629-1
Appendix 1 Map: B-5
Rocky Flats Number: 94,95
SWMU Number: 121
Building Number: 774

Tanks	Reference: (3)	Reference: (6)	Reference: ( )	Reference: ( )
Number of Tanks:	2	2		
Tank Material:				
Description of Tank:	Appear as concrete concrete vaults			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):		14,000		
Date of Installation:		1952		
Date of Abandonment:		1970		
Age (Years):		36		
Disposition:		Abandoned		
Waste Streams:				
Reported Releases:				
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks	Reference: (1)	Reference: (5)	Reference: (3)	Reference: (6)
Tank Designation: T-17			DWG 26629-1	
Appendix 1 Map: B-5				
Rocky Flats Number: 96-99				
SWMU Number: 121				
Building Number: 774				
Number of Tanks:	4		2	4
Tank Material:	Concrete			Concrete
Description of Tank:	UG (underground)	Underground	Horizontal cylindrical tanks	
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	7,500			7500
Date of Installation:				1969
Date of Abandonment:	1970			1970
Age (Years):	34			19
Disposition:	Removed			Removed
Waste Streams:				
Reported Releases:	Yes - in area of tanks T-14, T-15, T-16 and T-17			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks	Reference: (1)	Reference: (3)	Reference: (6)	Reference: ( )
Tank Designation: T-18		DW6 25845-X16		
Appendix 1 Map: C-5				
Rocky Flats Number: 100				
SWMU Number: 121				
Building Number: 778				
Number of Tanks:	1		1	
Tank Material:	Concrete		Concrete	
Description of Tank:	UG (underground)	North side of bldg. @ grid coord. A-5W		
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):				
Date of Installation:				
Date of Abandonment:	October 1982		October 1982	
Age (Years):				
Disposition:			Removed	
Waste Streams:		Laundry waste		
Reported Releases:	None			
Comments:		Laundry waste lift station		

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-19
Appendix 1 Map: C-5
Rocky Flats Number: 101,102
SWMU Number: 121
Building Number: 779

	Reference: (1)	Reference: (4)	Reference: (5)	Reference: (6)
Number of Tanks:	2	2	2	2
Tank Material:	Concrete	Concrete	Concrete	Concrete
Description of Tank:	UG (underground)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	1,000	1,000 (5'x9'x7.5')	1,000	
Date of Installation:				1964
Date of Abandonment:	December 1982		December 1982	December 1982
Age (Years):	24	16	15	24
Disposition:	Abandoned	To be doubly contained Auth. #375030	Abandoned, cleaned and painted in December 1982	Decntaminated and converted to non-UST
Waste Streams.				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-20
Appendix 1 Map: C-5
Rocky Flats Number: 103,104
SWMU Number: 121
Building Number: 779

	Reference: (1)	Reference: (4)	Reference: (5)	Reference: (6)
Number of Tanks:	2	2	2	2
Tank Material:	Concrete	Concrete	Concrete	Concrete
Description of Tank:	UG (underground)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	8,000	8,000 (22'x9'x7.5')	8,000	8,000
Date of Installation:				1964
Date of Abandonment:	December 1982		December 1982	December 1982
Age (Years):	24	16	15	24
Disposition:	Abandoned	To be doubly contained Auth. #375030	Abandoned, cleaned and painted in December 1982	Decontaminated and converted to non-UST
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-21
Appendix 1 Map: E-5
Rocky Flats Number: 57
SWMU Number: 164.2
Building Number: 828

	Reference: (1)	Reference: (6)	Reference: ( )	Reference: ( )
Number of Tanks:	1	1		
Tank Material:	Concrete	Concrete		
Description of Tank:	SU (open top sump)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	250			
Date of Installation:		1964		
Date of Abandonment:	1978	1978		
Age (Years):	25	24		
Disposition:	Abandoned	Abandoned		
Waste Streams:		Process waste		
Reported Releases:	None			
Comments:		Currently under RCRA closure		

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-22
Appendix 1 Map: E-5
Rocky Flats Number: 58
SWMU Number: 164.2
Building Number: 828

	Reference: (1)	Reference: (5)	Reference: (6)	Reference: ( )
Number of Tanks:	2	2	2	
Tank Material:	Stainless steel		Carbon steel	
Description of Tank:	AG2 (above grade in depressed sump)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	250		250	
Date of Installation:	1978	1978	1978	
Date of Abandonment:				
Age (Years):	25			
Disposition:	Abandoned	Abandoned	Out-of-service	
Waste Streams:		Uranium wastes	Radionuclides (to be verified)	
Reported Releases:	None			
Comments:			Possibly removed from ground	

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-23
Appendix 1 Map: E-5
Rocky Flats Number: 59,60
SWMU Number: 121
Building Number: 865

	Reference: (1)	Reference: (3)	Reference: (4)	Reference: (5)
		DWG 26378-X01		
Number of Tanks:	2	2	2	2
Tank Material:	Concrete		Concrete	Concrete
Description of Tank:	UG (underground)	Underground		Underground
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	3,000		3,000	3,000
Date of Installation:				
Date of Abandonment:	May 1982			May 1982
Age (Years):	9			9
Disposition:	Abandoned	Removed piping and pumps at least after 8/21/81	To be double contained	Abandoned, cleaned and painted in May 1982
Waste Streams:		Process waste		
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

	Reference: (6)	Reference: ( )	Reference: ( )	Reference: ( )
Tank Designation: T-23 (cont)				
Appendix 1 Map: E-5				
Rocky Flats Number: 59,60				
SWMU Number: 121				
Building Number: 865				
Number of Tanks:	2			
Tank Material:	Concrete			
Description of Tank:	Underground			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	3000			
Date of Installation:				
Date of Abandonment:	May 1982			
Age (Years):				
Disposition:	Converted to occupied space			
Waste Streams:				
Reported Releases:				
Comments:	Under RCRA closure			

Original Process Waste Line
Data Summary Sheet

Tanks	Reference: (1)	Reference: (4)	Reference: (5)	Reference: (3)
Tank Designation: T-24				DWG 25609-X09
Appendix 1 Map: F-5				
Rocky Flats Number: 105-111				
SWMU Number: 121				
Building Number: 887				
Number of Tanks:	7	7	7	7
Tank Material:	Stainless steel	Stainless steel	Stainless steel	
Description of Tank:	AG2 (above grade in depressed sump)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	2,700	2,700	2,000	
Date of Installation:				
Date of Abandonment:	December 1980		December 1980	
Age (Years):	36	36	36	
Disposition:	Active-converted to the new process waste system or the firewater deluge colletion system		Active	"To remain"; Drawing date 6/17/76
Waste Streams:				Process waste
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-24 (cont)
Appendix 1 Map: F-5
Rocky Flats Number: 105-111
SWMU Number: 121
Building Number: 887

Tanks	Reference: (6)	Reference: (7)	Reference: ( )	Reference: ( )
Number of Tanks:	7	7		
Tank Material:	Stainless steel	Stainless steel		
Description of Tank:				
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	2700	3000		
Date of Installation:	1952	1971		
Date of Abandonment:	December 1980			
Age (Years):	36			
Disposition:	Decontaminated and converted to new system			
Waste Streams:		Process, laundry and lab waste		
Reported Releases:				
Comments:		Part B permitted Unit No. 40.20 - 40.26		

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-25
Appendix 1 Map: E-5
Rocky Flats Number: 112,113
SWMU Number: 121
Building Area: 883

Tanks	Reference: (1)	Reference: (4)	Reference: (5)	Reference: (6)
Number of Tanks:	2	1	1	2
Tank Material:	Steel	Welded stainless steel	Steel	Steel
Description of Tank:	AG2 (above grade in depressed sump)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	750	750	750	750
Date of Installation:				1952
Date of Abandonment:	August 1984		August 1984	August 1984
Age (Years):	23	23	14	36
Disposition:	Active-converted to the new process waste system or the firewater deluge collection system		Active	Converted to new system
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks	Reference: (1)	Reference: ( )	Reference: ( )	Reference: ( )
Tank Designation: T-25 (cont)				
Appendix 1 Map: E-5				
Rocky Flats Number: 112-113				
SWMU Number: 121				
Building Number: 883				
Number of Tanks:	2			
Tank Material:	Steel			
Description of Tank:				
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	750			
Date of Installation:	1956			
Date of Abandonment:				
Age (Years):	32			
Disposition:				
Waste Streams:	Waste water, pH>10			
Reported Releases:				
Comments:	Part B Ref. No. 40.30 & 40.31			

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-27
Appendix 1 Map: E-5
Rocky Flats Number: 117
SWMU Number: 121
Building Number: 886

	Reference: (1)	Reference: (4)	Reference: (6)	Reference: ( )
Number of Tanks:	1	1	1	
Tank Material:	Steel	Steel		
Description of Tank:	AG1 (aboveground	Above ground; 18' west of Bldg. 886		
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	300	300	300	
Date of Installation:	1978		1978	
Date of Abandonment:				
Age (Years):				
Disposition:	Abandoned		Abandoned	
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-28
Appendix 1 Map: E-5
Rocky Flats Number: 62,63
SWMU Number: 121
Building Number: 889

	Reference: (1)	Reference: (3)	Reference: (4)	Reference: (5)
Number of Tanks:	2	2	2	2
Tank Material:	Concrete		Concrete/carbolene lining	Concrete
Description of Tank:	UG (Underground)	Underground	Underground (15' deep)	Underground
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	1,000		1,000 (5'x7'x4.25')	1,000
Date of Installation:				
Date of Abandonment:	May 1983			May 1983
Age (Years):	23		23	14
Disposition:	Abandoned	Removed piping and plumbing inside tanks after 8/21/81	To be doubly contained under Auth. #385050	Not cleaned
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks	Reference: (6)	Reference: ( )	Reference: ( )	Reference: ( )
Tank Designation: T-28 (cont)				
Appendix 1 Map: E-5				
Rocky Flats Number: 62,63				
SWMU Number: 121				
Building Number: 889				
Number of Tanks:	2			
Tank Material:	Concrete			
Description of Tank:				
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	1000			
Date of Installation:	1966			
Date of Abandonment:	May 1983			
Age (Years):	22			
Disposition:	Currently old process tank			
Waste Streams:	Radionuclides			
Reported Releases:				
Comments:	Under RCRA closure			

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-29
Appendix 1 Map: B-5
Rocky Flats Number: 118
SWMU Number: 121
Building Number: 207

	Reference: (1)	Reference: (2)	Reference: (5)	Reference: (6)
Number of Tanks:	1	1	1	1
Tank Material:	Steel		Steel	Steel
Description of Tank:	OG (on grade)	Tank T-D, above-ground	OG	
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	200,000	200,000	200,000	200,000
Date of Installation:				1950
Date of Abandonment:	Active			
Age (Years):	38			38
Disposition:	Active-converted to the new process waste system or fire water deluge collection system	To be removed	Active	Old process waste tank currently under closure
Waste Streams:			Rad.	
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks	Reference: (1)	Reference: (3)	Reference: (6)	Reference: (7)
Tank Designation: T-30		DWG 25788-X12		
Appendix 1 Map: C-5				
Rocky Flats Number: 119				
SWMU Number: 121				
Building Number: 731				
Number of Tanks:	1		1	1
Tank Material:	Concrete	Concrete	Concrete	Concrete
Description of Tank:	SU (open top sump)	E. of Bldg. 707		
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):				23111 25.8' X 12' X 10'
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:			Old process waste tank currently under RCRA closure	
Waste Streams:		Process waste		Laundry room waste
Reported Releases:	None			
Comments:		Sump in tank vault for T-11		Part B Secondary Containment Ref. 2011

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-31
Appendix 1 Map: C-7
Rocky Flats Number: 120
SWMU Number: 121
Building Number: 990

Tanks	Reference: (1)	Reference: (6)	Reference: ( )	Reference: ( )
Number of Tanks:	1	1		
Tank Material:	Steel	Steel		
Description of Tank:	OG (on grade)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):				
Date of Installation:				
Date of Abandonment:	None			
Age (Years):				
Disposition:	Active, converted to the new process waste or firewater deluge collection system	Currently in use; process waste system		
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-32
Appendix 1 Map: F-5
Rocky Flats Number: 121
SWMU Number: 121
Building Number: 887

	Reference: (1)	Reference: (6)	Reference: (7)	Reference: ( )
Number of Tanks:	1	1	1	
Tank Material:	Concrete	Concrete	Concrete	
Description of Tank:	SU (open top sump in basement corner)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):			131160	
Date of Installation:				
Date of Abandonment:	December 1980	December 1980		
Age (Years):				
Disposition:	Active-converted to the new process waste or the fire water deluge collection system	Converted to new PW system		
Waste Streams:			Lab and laundry waste	
Reported Releases:	None			
Comments:			Part B Secondary Containment Ref. No. 2014	

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-33
Appendix 1 Map: C-4
Rocky Flats Number: 122
SWMU Number: 121
Building Number: 561

	Reference: (1)	Reference: (5)	Reference: (6)	Reference: ( )
Number of Tanks:	1	1	1	
Tank Material:	Stainless steel	Stainless steel	Stainless steel	
Description of Tank:	AG2 (above grade in depressed sump)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	5,000		5000	
Date of Installation:				
Date of Abandonment:	July 1982	July 1982	July 1982	
Age (Years):				
Disposition:	Removed	Removed	Removed	
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-34
Appendix 1 Map: C-4
Rocky Flats Number: 123,124
SWMU Number: 121
Building Number: 561

	Reference: (1)	Reference: (5)	Reference: (6)	Reference: ( )
Number of Tanks:	2	2	2	
Tank Material:	Stainless steel	Stainless steel	Stainless steel	
Description of Tank:	AG1 (above grade)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	5,000			
Date of Installation:			1969	
Date of Abandonment:	July 1982	July 1982	July 1982	
Age (Years):	19		19	
Disposition:	Active-converted to the new process waste or the fire water deluge collection system	Active	Converted to new PW system	
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks	Reference: (1)	Reference: ( )	Reference: ( )	Reference: ( )
Tank Designation: T-35				
Appendix 1 Map: C-4				
Rocky Flats Number: 125				
SWMU Number: 121				
Building Number: 561				
Number of Tanks:	1			
Tank Material:	Concrete			
Description of Tank:	SU			
	(open top sump)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):				
Date of Installation:				
Date of Abandonment:	July 1982			
Age (Years):	19			
Disposition:	Abandoned			
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tank Designation: T-36
Appendix 1 Map: B-5
Rocky Flats Number: 48
SWMU Number: 121
Building Number: 771C

Tanks	Reference: (1)	Reference: (6)	Reference: ( )	Reference: ( )
Number of Tanks:	1	1		
Tank Material:	Stainless steel	Stainless steel		
Description of Tank:	AG2 (above grade in depressed sump)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	500	500		
Date of Installation:		1968		
Date of Abandonment:	1984	1984		
Age (Years):	31	20		
Disposition:	Abandoned	Currently old process waste tank		
Waste Streams:		Floor drain sump RAD		
Reported Releases:	None			
Comments:		Currently under RCRA closure		

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-37
Appendix 1 Map: B-5
Rocky Flats Number: 126
SWMU Number: 121
Building Number: 771C

	Reference: (1)	Reference: (6)	Reference: ( )	Reference: ( )
Number of Tanks:	1	1		
Tank Material:	Concrete	Concrete		
Description of Tank:	SU (open top sump)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):				
Date of Installation:				
Date of Abandonment:				
Age (Years):				
Disposition:		Old process waste tank currently under closure		
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks	Reference: (1)	Reference: (6)	Reference: ( )	Reference: ( )
Tank Designation: T-38				
Appendix 1 Map: C-5				
Rocky Flats Number: 127				
SWMU Number: 121				
Building Number: 779				
Number of Tanks:	1	1		
Tank Material:		Concrete		
Description of Tank:	UG (underground)			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):		1000		
Date of Installation:				
Date of Abandonment:	1982	1982		
Age (Years):				
Disposition:	Active-converted to the new process waste system or the firewater deluge collection system	Converted to new process waste system in 1982		
Waste Streams:				
Reported Releases:	None			
Comments:				

Original Process Waste Line
Data Summary Sheet

Tanks

Tank Designation: T-39
Appendix 1 Map: F-5
Rocky Flats Number: 128-131
SWMU Number: 121
Building Number: 881

Tanks	Reference: (4)	Reference: (6)	Reference: ( )	Reference: ( )
Number of Tanks:	4	4		
Tank Material:	Stainless steel	Stainless steel		
Description of Tank:	Located in Room 114A			
Tank Diameter (in.):				
Tank Height (ft.):				
Tank Volume (gallons):	250	250		
Date of Installation:	1952			
Date of Abandonment:				
Age (Years):	36			
Disposition:		Old process waste tank currently under closure		
Waste Streams:	2 tanks for caustics 2 tanks for HN03 & Be			
Reported Releases:				
Comments:				

APPENDIX 3

REFERENCE DOCUMENTS

APPENDIX 3 . Reference Documents

Selected reports cited in the closure plan and in Appendix 2, Original Process Waste Lines Data Summary Sheets, are included in this appendix for reference. The included references are listed below:

CONCEPTUAL DESIGN REPORT, ENVIRONMENTAL IMPROVEMENT PROJECTS, Rockwell International, Rocky Flats Plant, Golden Colorado, December, 1985.

SURVEY OF THE STATUS OF THE EXISTING PROCESS WASTE LINES, Sunday, G., Rockwell International, September, 1976, (unnumbered report).

REPORT OF AN INVESTIGATION ON A RECENT PROCESS WASTE PIPELINE LEAK, Rockwell International, October 24, 1980, ES-376-80-217

UNUSUAL OCCURENCE REPORT - VALVE VAULT #7 OVERFLOW, APRIL 4, 1983, Rockwell International, May 5, 1983, UOR NUMBER RFP 83-2-SAGE 83-1.

A HISTORICAL SUMMATION OF ENVIRONMENTAL INCIDENTS AFFECTING SOILS AT OR NEAR THE U.S. AEC ROCKY FLATS PLANT, Dow Chemical, Undated (approximate date fall 1983), by J.B. Owen and L.M. Steward (Draft).

TANK LIST, Rockwell International, Mr. Bob James, 1988

CONCEPTUAL DESIGN REPORT

ENVIRONMENTAL IMPROVEMENT PROJECTS

UNDERGROUND PIPING AND TANK REMOVAL

ROCKY FLATS PLANT
Golden, Colorado

U.S. DEPARTMENT OF ENERGY
Albuquerque Operations Office
Albuquerque, New Mexico

Prepared by

FACILITIES ENGINEERING DEPARTMENT
Rocky Flats Plant
North American Space Operations
Rockwell International
Authorization 389801

December, 1985

SECTION 2

TABLE OF CONTENTS

UNDERGROUND PIPING AND TANK REMOVAL

1 PART 1 - DESIGN CONCEPT

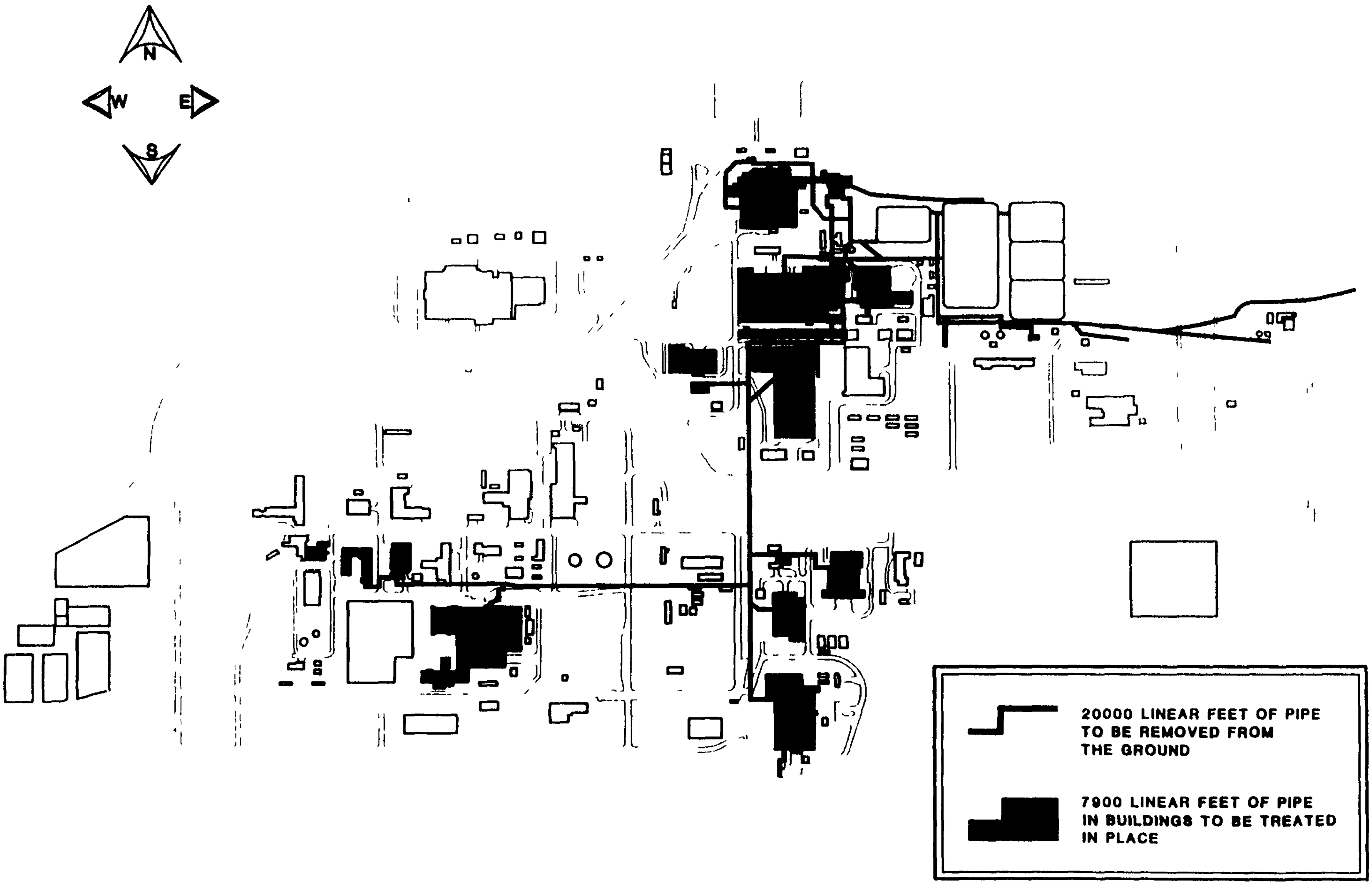
1.1 GENERAL DESCRIPTION OF THE PROJECT:

This project will provide for the removal of contaminated underground piping, storage tanks, surrounding bedding material and underlying contaminated soils from the abandoned process waste system located throughout the Department of Energy's 384 acre Rocky Flats Plant Site, north of Golden, Colorado. Figure 1 is an aerial photo of the Plant, showing production facilities as well as the Great Western Reservoir located east of the Rocky Flats Plant. A recent project provided a new contained, inspectable, and alarmed waste piping system which replaced most of the old network of buried process waste and treatment piping at the Plant. Additional pipes are scheduled to be abandoned before the completion of design on this proposed project. Other lines have been abandoned in place and have remained unused for many years. Removal of these pipes will further eliminate the potential for leaching of contaminants into surrounding soil and ultimately into ground water aquifers. Figure 2 shows the abandoned piping network to be removed, and its distribution throughout the Plant. Also shown are the buildings under which inaccessible piping is located. Approximately 17,000 linear feet of trenching will be required to remove an estimated 20,000 linear feet of buried piping. An additional 7900 linear feet of abandoned building process waste system piping, under concrete floor slabs, is inaccessible and will be flushed and plugged to stabilize contained contaminants. This piping will be abandoned in place until final decommissioning of the facility.

Six process waste storage tanks and surrounding contaminated soil will also be removed. Six other tanks will be decontaminated in-place and used for emergency fire water storage. Figure 3 locates all twelve tanks on the Plant Site and indicates whether the tank is to be removed or decontaminated. The abandoned process waste tanks to be removed or reworked, in priority order, are as follows: (1) Slurry Tank 40 located under the Waste Treatment Building (774); (2) Tanks 66, 67, and 68 located southeast of Building 774; (3) aboveground Tank 207 located south of Building 774; (4) Tank 123 located south of the Production Support Building (441), Area 11, will be removed along with the surrounding soil; (5) four process waste and laundry waste storage tanks located on the north side of the Manufacturing Building (776); and (6) two process and laundry water tanks located north of the Plutonium Recovery Building (771), decontaminated, painted, and used for emergency fire water storage.

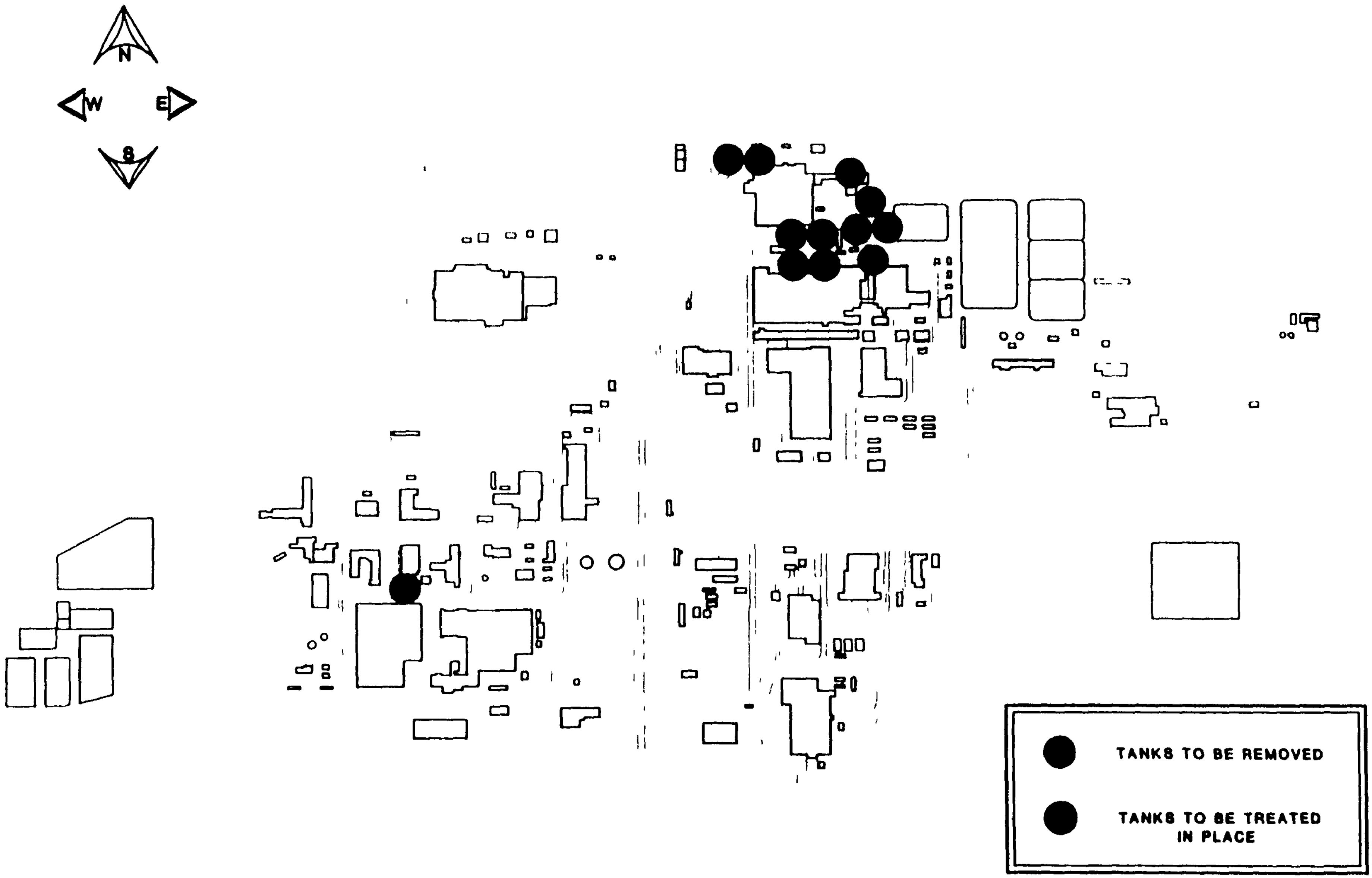
Contaminated soils, piping and concrete from removed utilities will be packaged and shipped offsite for storage at the Nevada Test Site or other approved hazardous waste repository. Residual liquids and sludges within the pipes will be removed and processed through existing Liquid Process Waste Treatment Systems located in Building 374 at the Rocky Flats Plant.

FIGURE 1



ABANDONED PIPING AT ROCKY FLATS PLANT

FIGURE 2



ABANDONED TANKS AT ROCKY FLATS PLANT
FIGURE 3

1.2 JUSTIFICATION:

The purpose of this project is to eliminate a potential for a Plant shutdown due to a possible release of radioactive material into adjacent soils or the introduction of volatile organic compounds (V.O.C.) or other hazardous chemicals into the local ground water. Obsolete piping and tanks, which were heavily used for 25 years, are not inspectable and several dozen minor leaks have been documented over the years. Historical records are scarce, however, data indicates a high probability that the following contaminants have been deposited in the piping and tanks: 1) plutonium; 2) uranium; 3) americium; 4) beryllium; 5) nickel; 6) carbon tetrachloride; 7) chromates; and 8) nitrates.

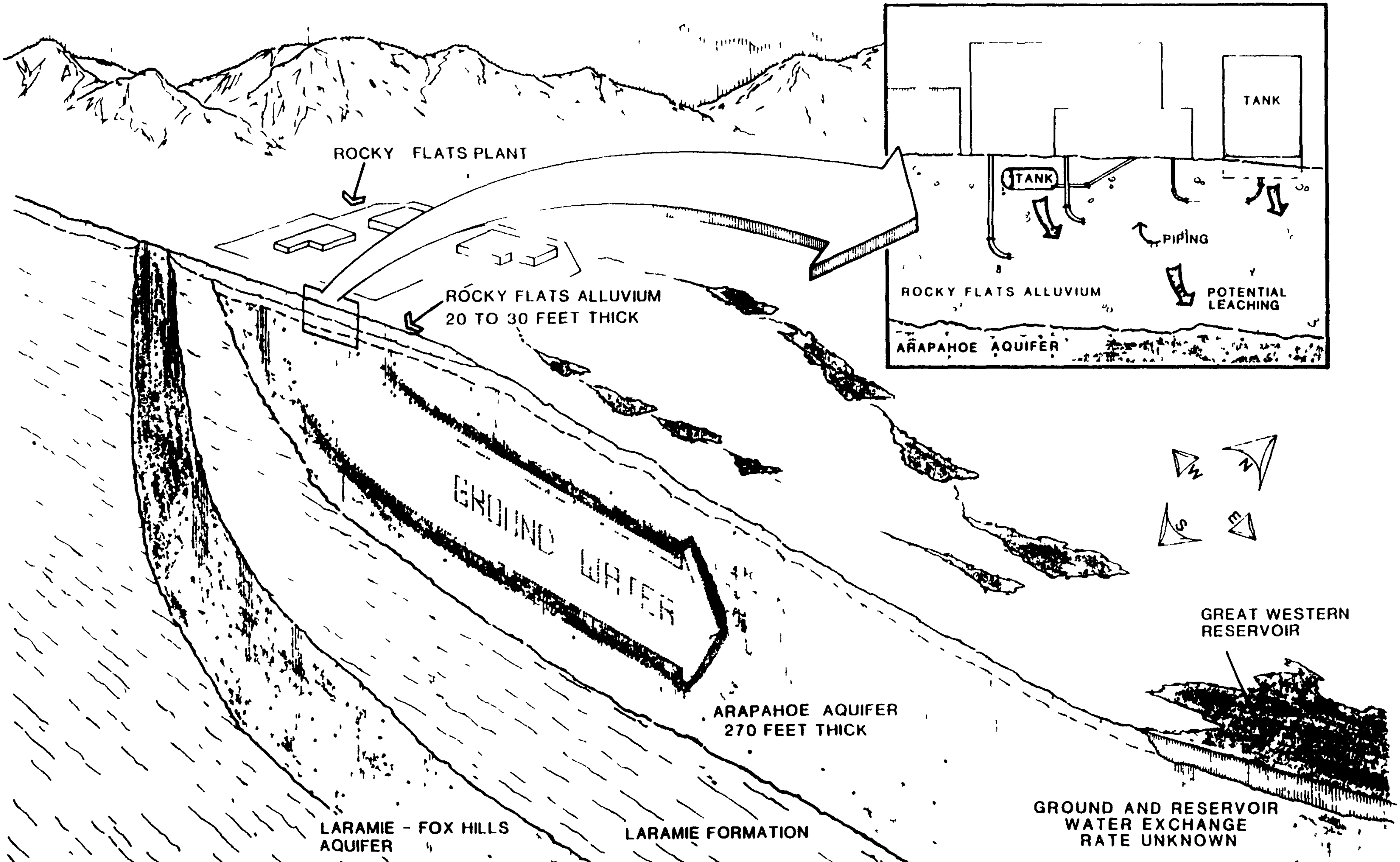
As a conclusion of the documented leaks, it is obvious that contaminants have been deposited outside of the process waste piping in the adjacent bedding soils. The contaminants become an environmental concern in that they are exposed to several modes of mobilization. Downward movement may occur as a result of heavy rainfall soaking into the ground and carrying contaminants downward with it. Annual rains contributing to ground water recharge in the vicinity of the Rocky Flats Plant have been estimated at 20 million gallons. The capillary properties of trench backfill material may draw contaminants up in a manner similar to a sponge. Changes in the level of the ground water table from above the pipe network to below the pipe can cause "flushing" of the contaminants. Horizontal movement might be caused either by the flow of liquid along the outside of any of the Plant's utility piping through porous bedding materials or by the natural flow of the areas ground water.

Figure 4 shows the major geological formations in the area of the Plant Site. The top soil layer is known as the Rocky Flats Alluvium. This soil layer tapers off and ends just east of the Plant proper. The next layer is known as the Arapahoe Aquifer. The Arapahoe Aquifer is relatively porous and is an important water supply for cities and private well owners downstream of the Rocky Flats Plant. If contaminants are allowed to disperse into the Arapahoe Aquifer the resulting plume of hazardous materials could adversely effect use of this important water shed, resulting in civil actions and criminal penalties.

Although the rate of dispersion is dependent on many factors, including the solubility of the contaminant, the permability of the soil and the flow rate of the ground water, dispersion is still a fact. The distance the contaminants have traveled is not yet known. Studies are in progress which will help define the extent of the problem.

Potential contamination of the soil layers and groundwater by the abandoned piping network poses a significant threat to human health and the environment. These risks are critical and should prompt immediate cleanup actions to eliminate the threat.

There are several regulatory concerns discussed in the following paragraphs that also require removal of the abandoned piping and tanks.



SITE GEOLOGY

FIGURE 4

First, the Plant's National Pollutant Discharge Elimination System (NPDES) permit, which is administered by the EPA is potentially at risk of suspension or revocation. If the permit is revoked the Plant may be required to shutdown until corrective action is taken. The NPDES permit establishes stringent limits on physical/chemical parameters monitored in all releases from the Plant Site. The horizontal movement of contaminants through the Rocky Flats Alluvium could surface as the alluvial soils taper off (refer to figure 3) upstream of the Plant's storm water retention ponds. Surface water could deposit the contaminants in the ponds, contributing to the quantity of hazardous materials retained, and potentially, to a permit violation at any of six EPA monitoring stations located in the same drainage basin. If, for any reason the Rocky Flats Plant does not comply with, or is unable to comply with, daily maximum effluent limitations specified within the permit, it faces consequential EPA actions including penalties and possible revocation of the permit to discharge waters from the ponds. Since the Rocky Flats Plant is required by the permit to "take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance", the Plant may be required to process the water retained within the ponds rather than releasing it. Processing would need to be accomplished in the Liquid Waste Treatment Facility, Building 374. This waste treatment facility was not sized with sufficient surplus capacity to handle the pond water. Therefore, waste generating production processes could have to be curtailed until sufficient drawdown of the ponds occured to handle anticipated precipitation.

Second, accomplishment of this project may preclude state intervention in Plant operations under the Resource Conservation and Recovery Act (RCRA). RCRA's goal, through State implementation, is to regulate the management of hazardous materials from the time of their generation to the time of their proper disposal. Leakage from the abandoned process waste piping is not in compliance with RCRA's hazardous waste management goals. On November 1, 1985 the Rocky Flats Plant was required to submit a permit application, to the State of Colorado. The abandoned process piping was included as a part of that application, outlining potential concerns. Although the requirements of the State's RCRA program are still evolving during the early stages of implementation, it is almost a certainty that the waste piping will fall under the monitoring requirements of RCRA, Subtitle C. Using a parallel RCRA provision which governs the management of non-radioactive, non-mixed waste known as the Leaking Underground Storage Tank (LUST) program as an indication of the upcoming requirements of Subtitle C, it seems quite likely that the piping will have to be removed or an extensive system of monitoring well stations will have to be established to track the migration of contaminants. Assuming the permit is required to continue operations at the Plant, maintaining compliance with permit requirements is of paramount importance. The permit may be terminated "when a managers treatment, storage or disposal activity poses a threat to human health or the environment". Leaks in the abandoned systems can certainly be interpreted by the jurisdictional agency as posing a "threat to human health or the environment".

Third, removing the specified piping and tanks would prevent a violation of EPA Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements. CERCLA is a law created to provide liability, compensation, cleanup, and emergency response for hazardous substances released into the environment. Any facility, such as the Rocky Flats Plant, "knowingly releasing any elements, compounds, mixtures, solutions, or substances which present substantial danger to public health and welfare, or the environment", is liable for penalty under this act. If the piping and tanks aren't removed, and are found in violation of CERCLA requirements, (by releasing, or threatening a release of any substance defined as hazardous under Section 101 (14) of Comprehensive Environmental Response, Compensation and Liability Act of 1980) EPA intervention in plant operations may result, until acceptable steps towards compliance are completed (e.g. Oak Ridge, Y-12 Plant).

Fourth, the underground piping and tank removal project has been sighted as a priority action item under the Department of Energy, Albuquerque Operations Office Comprehensive Environmental Assessment and Response Program (CEARP). The objective of CEARP is to utilize the combined forces of the Albuquerque Operations Office, the Area Office, the Prime Operating Contractors, and the Los Alamos National Laboratory in implementing a phased program to identify, assess, and correct current or potential environmental problems.

Finally, removal of the abandoned process waste lines and tanks will conform to draft DOE Order 5480 initiating remedial actions to control migration of hazardous substances, and comply with CERCLA Section 101 (24) defining remedial action as those "consistent with permanent remedy taken, instead of, or in addition to, removal actions in the event of a release or threatened release of hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment".

The presence of the abandoned system often causes interference with construction efforts. During excavation work, pipes are frequently encountered and/or broken. Due to the known contaminants within the pipe, typical demolition or repair techniques cannot be used. Construction crews are delayed while monitoring and removal/repair efforts are completed. Rocky Flats Plant Waste Management procedures, and Contamination and Exposure Control rules must be followed. Adhering to these guidelines involves substantial costs and delays in otherwise simple construction tasks.

Any delay in approval of funding will result in several adverse impacts upon the project. Although the extent of leaching of contaminants is not documented, considering the types of soil on Plant Site, the assumption that leaching is taking place is reasonable. Since the cost estimate is based on the volume of contaminated pipe and soil to be removed, delays in funding approval will result in additional soils requiring removal and associated increased costs.

In order to satisfy all of the requirements imposed by various regulatory agencies, and to terminate the constant threat to human health and the environment, the underground piping and tanks must be removed.

1.3 RELATIONSHIP TO OTHER PROJECTS:

The installation of the new, contained, inspectable piping system resulted in the need for abandonment and subsequent removal of the old system. Additional phases of this project must be completed before other piping, as shown on the drawings (see appendix 1.12), can be declared abandoned. These continuing phases are scheduled to be complete within the proposed construction period of this project.

The Underground Piping and Tank Removal project also shares many characteristics with the Leaking Underground Storage Tanks (LUST) program. The LUST program is a new RCRA provision designed specifically for the control and prevention of leaking underground storage tanks and associated piping. LUST bans the installation of unprotected storage tanks, initiates a tank notification program, sets federal technical standards for all tanks, coordinates federal and state efforts, and provides for federal inspection and enforcement. Tanks containing hazardous waste regulated under the RCRA hazardous waste program Subtitle C, are not covered under LUST. Since the Underground Piping and Tank Removal project is regulated by RCRA Subtitle C, in this case, the LUST program doesn't directly apply. However, the Underground Piping and Tank Removal project closely parallels the requirements in the LUST program, hence assuming compliance with current federal concerns and requirements with respect to contaminated underground storage tanks.

1.4 ALTERNATIVES:

There were several alternatives considered for this project. First, the option of removing only those portions of abandoned process waste piping and tanks having the highest hazard potential was considered. However, the remaining piping and tanks would still place the Rocky Flats Plant in noncompliance with State and EPA-CERCLA regulations. Second, draining, flushing, and plugging the entire plant wide abandoned piping network was considered. However, cleaning 20,000 linear feet of process waste piping underground is presently not technically feasible and still would not remove the potential migration of contaminants already outside the pipes. An extensive and costly monitoring system would still be necessary to track the impacts of these hazardous materials on the environment.

1.5 DESIGN CONCEPT:

1.5.1 Project Design Description:

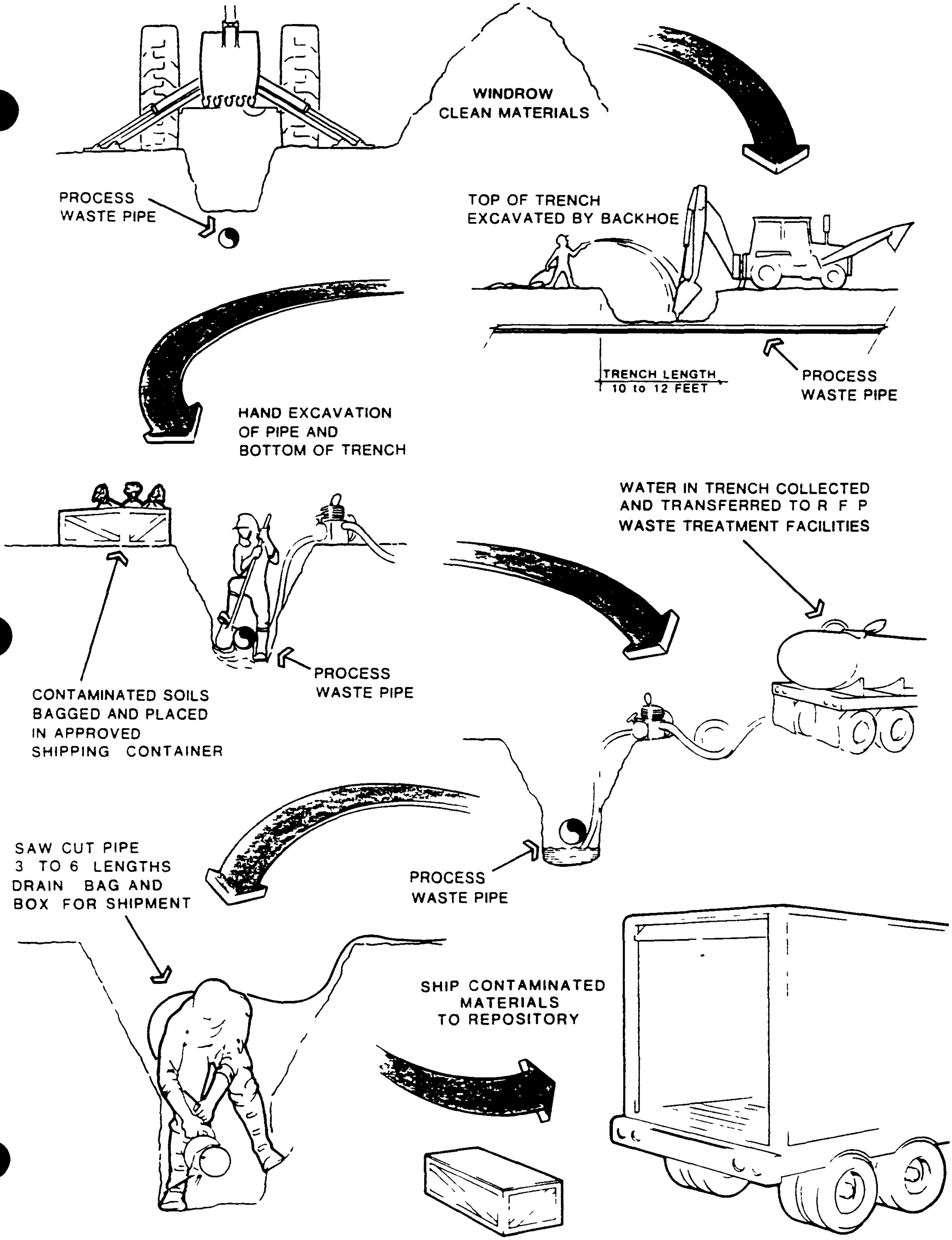
Approximately 20,000 linear feet of buried piping, six process waste storage tanks, and associated surrounding bedding material and underlying soils located throughout the Rocky Flats Plant Site will be excavated and removed in the project. Six other process waste storage tanks will be emptied, cleaned, painted and put into service as fire water storage reservoirs. 7900 linear feet of inaccessible piping will also be addressed in this project. Since the piping is inaccessible, (located below building basement floor slabs), it will not be excavated and removed. Rather, it will be cleaned and abandoned in place. Figures 5, 6, and 7 illustrate the methods to be used in accomplishing these tasks.

The buried piping and tanks will be treated in a similar manner. Figures 5 and 6 show, in diagrammatic form, the scope and process proposed to accomplish the project. The appendix to this report contains drawings which more completely describe the scope of the work. It should be noted that the drawings show only the piping to be removed. They do not show other existing utilities which may interfere with removal efforts.

The soil above the piping will be removed by backhoe, while the soil around the pipe will require hand excavation. During removal of the soil, soil and air contamination will be continuously monitored by Health, Safety & Environment (HS&E) personnel. Testing of the soil for volatile organic compounds (V.O.C.) and radioactive material will be accomplished on site using Gas Chromatography (G.C.) and portable Intrinsic Germanium Detectors. The principal hazards to human health anticipated during removal of the pipes and tanks are inhalation of contaminated dust particles and direct contact with contaminated soils and sludge. To prevent airborne dust, all soil will be wetted down with water prior to and during removal operations. Wetting of the soil will be kept to a minimum. Once the exposed soil layer is wet, underlying material will in turn become damp, controlling the propogation of dust from subsequent removal operations. Minimizing the use of water will also reduce the amount of liquid to be pumped from the excavated trench. To control direct contact with contaminants, white suits with respirators, booties, and gloves will be required for all personnel involved in removal activities.

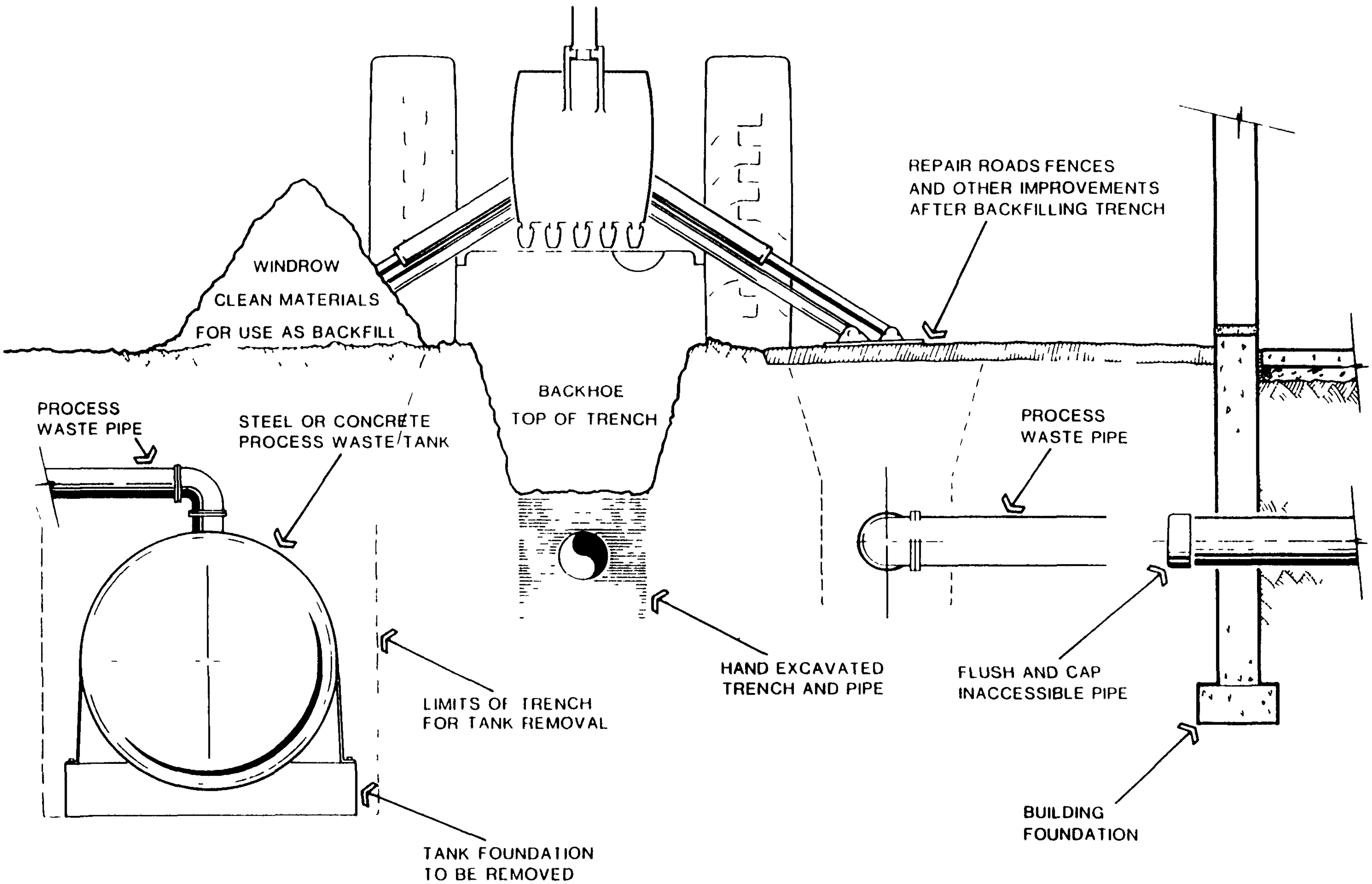
Each branch, or run of pipe between branches, buildings, valve pits, or manholes, will be monitored using Gamma Scan equipment after the soil above the pipe has been removed. Assuming contamination levels do not warrant efforts to prevent a criticality, the pipe will be saw cut within the trench into 3 to 6 foot sections (opening each end), then drained of all liquids contained in the pipe. Dust generated during saw cut operations will be controlled and collected at the source. The opened ends of the pipe section will be wrapped in plastic prior to removal from the trench. The pipe section will be monitored prior to placement in the shipping box to document the quantity of radioactive material being transported offsite. Excavation and removal of each run of drained and wrapped pipe will be accomplished section by section with no more than 10 to 12 feet of trench open at any one time. This will control spreading of contaminants in the event of a sudden thunderstorm and associated downpour.

Soil around the buried pipe will be monitored as previously discussed. In areas where no contamination is detected, only the soil required to remove the pipe will be excavated. However, when contamination is detected, soil will be carefully scraped and broken-up using the backhoe bucket. The soil will be bagged in the trench using a shovel or other appropriate means. Bagging the soil in the trench will further reduce the potential for airborne contaminants. The process of monitoring and further excavation will continue until all "hot" soil in the area has been removed. Bagged soil will be lifted out of the trench and placed directly into boxes for shipment to an approved hazardous waste repository. The contents of each box will be monitored to document the quantity of radioactive material being shipped. The backhoe bucket will be cleaned after each encounter with contaminated soil.



ABANDONED PIPE REMOVAL

FIGURE 5



REPAIR ROADS FENCES
AND OTHER IMPROVEMENTS
AFTER BACKFILLING TRENCH
WINDROW
CLEAN MATERIALS
FOR USE AS BACKFILL
BACKHOE
TOP OF TRENCH
PROCESS
WASTE PIPE
STEEL OR CONCRETE
PROCESS WASTE/TANK
PROCESS
WASTE PIPE
HAND EXCAVATED
TRENCH AND PIPE
FLUSH AND CAP
INACCESSIBLE PIPE
LIMITS OF TRENCH
FOR TANK REMOVAL
BUILDING
FOUNDATION
TANK FOUNDATION
TO BE REMOVED

FIGURE 6

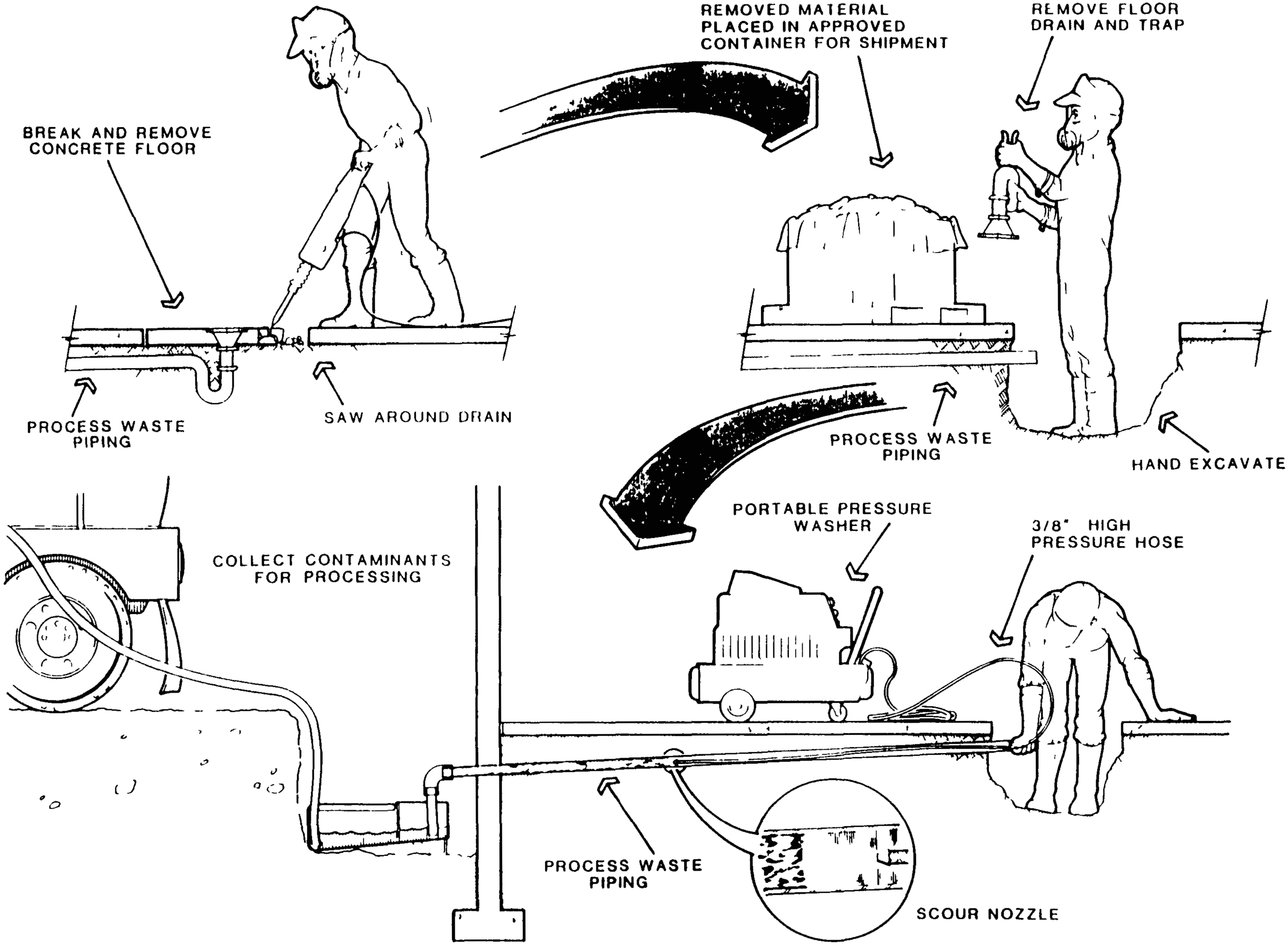
Any ground water encountered during excavation will be monitored before it is pumped from the trench. Water which is determined to be uncontaminated ground water will be released into existing storm drainage systems. If the water is found to be contaminated, it will be pumped into geometrically stable tanks (pencil tank) to await further analysis by Criticality Engineering personnel. Assuming low level contamination, the water will be transferred to the new Liquid Process Waste Treatment System (LPWTS) for processing in accordance with established procedures. If contamination thresholds of the LPWTS are exceeded, the water will be cycled within the geometrically stable tank and circulated through filters until acceptable levels have been obtained. Sludge encountered while draining the opened pipe sections will be bagged and placed into approved one-liter containers to be reclaimed or treated for proper disposal. Additional backfill required to replace the soil that is removed and boxed will be composed of impervious clay and obtained from areas outside of the facility.

All boxed materials will be loaded on trucks for shipment to the disposal site. Loads will be secured and covered to prevent spillage during transport. Due to the volume of material to be shipped, it is anticipated that the services of a contract trucking firm will be retained for the duration of the removal effort.

Each tank designated in Figure 2 to be removed will be saw cut or broken into small sections. All material will be boxed for shipment to an approved hazardous waste repository. Contaminated soil adjacent to the tank will be removed as outlined for soil around pipes.

If the soil around each tank, indicated in Figure 2 to be treated in place, is found to be free of contamination, the tank will be reconditioned for emergency fire water storage. The tank will be decontaminated by sand blasting or high pressure scouring, then cleaned and coated with a sealant-type paint. The protective coating will prevent fluid migration into, or out of, the decontaminated tank.

Figure 7 illustrates the proposed method for cleaning approximately 7900 linear feet of inaccessible process waste treatment piping. The piping was historically abandoned underneath basement floor slabs in buildings shown in Figure 2. During the installation of the new contained and inspectable process waste piping network, the old building systems were removed to the basement floor slab. Plugs were forced a short distance down the pipes and the first 8 to 12 inches of pipe was filled with concrete. In order to gain access to flush the abandoned pipe, the concrete plug must be removed. All personnel involved in the removal and flushing process will be protected from exposure to contaminants by wearing white suits with respirators, booties and gloves. Access will be accomplished by saw cutting the area around the plugged drain, then using a jack hammer to remove the concrete floor slab as shown in the upper left diagram of Figure 7. The soil around the drain will be hand excavated. The plugged drain will be cut beyond the seal trap, and removed. All removed soil, concrete and pipe will be assumed contaminated and immediately packaged for disposal at an approved hazardous waste repository.



INACCESSIBLE PIPE CLEANING
FIGURE 7

The terminal end of the pipe run, exterior of the building's foundation, will have already been excavated and opened. A 90 degree elbow will be attached to the open end, and directed into a catch basin. The basin will be equipped with special filters and baffles to prevent splashing of any flushed contaminants into the surrounding environment. The catch basin will be sized, proportioned and handled in a manner to assure compliance with Criticality Engineering requirements for geometric stability. A high pressure water nozzle and hose assembly will be fed into the upstream end of the exposed pipe to flush accumulated contaminants out of the pipe and into the catch basin. The nozzle/hose apparatus will be powered by a portable high pressure compressor which can be adequately operated by one individual. The hose will be capable of flushing 100 feet of continuous pipe length. Lengths greater than 100 feet between access points are not anticipated. The flushed contaminants in the catch basin will be monitored by Criticality Engineering personnel. If the contaminants are within acceptable levels, they will be pumped into a portable storage tank and transferred to the facility's Liquid Waste Treatment System for disposal. If the levels are unacceptable, the contaminants will be pumped into geometrically safe tanks for further analysis and determination of proper disposal. After flushing and draining, the pipe run will be capped on both ends. The excavated area around the removed floor drain will be backfilled with fresh material obtained off site. Finally, the backfill area will be capped with concrete to match the existing floor slab level.

All equipment used in the pipes or to collect material from the pipes will be cleaned and handled in accordance with the Rocky Flats Plant Contamination Exposure Control rules.

Concern with regard to Criticality Engineering and the use of geometrically stable containers may be addressed during Title I and II engineering design. The use of special equipment to monitor the level of contamination within the pipes before excavation and cleaning activities commence may show that measures to prevent the accumulation of a critical mass are not needed. If this proves to be the case, significant efforts can be eliminated in the handling of liquid waste encountered during project.

Incidental construction materials excavated during the removal effort (ie: thrust blocks, valve boxes, etc.) will be monitored and removed as necessary. Clean materials will be left in place.

During implementation of the project, as-built drawings will be continuously updated to reflect all work that has been done to the piping network. Noting such items as location of removed pipe, amounts removed, contamination levels remaining in inaccessible pipe, and type of pipe removed will be required as minimum documentation.

1.5.2 Energy Conservation:

An Energy Conservation Analysis is not applicable for this project because the use of conventional construction equipment is required leaving no alternatives open to energy conservation and primarily because it is a demolition project which consumes no energy after its completion.

1.5.3 Environmental Considerations:

1) No measurable pollution will be created by the work on this project. All activities will be closely monitored by the HS&E Environmental and Radiation Monitoring and Industrial Hygiene Personnel and all contaminated materials encountered in the work will be removed in strict accordance with Rocky Flats Plant Waste Management procedures.

2) Trench lengths will be kept to a minimum to prevent spread of contamination due to flooding caused by sudden thunderstorms and associated precipitation.

1.5.4 Facility and Equipment Maintainability Considerations:

Trench cuts through roads, drives, sidewalks and fences will be designed and scheduled to permit access throughout the facility at all times. All cuts will be restored to their original condition immediately after the trenches are backfilled.

Equipment required for this project will be standard items that are common in the construction industry. Normal equipment preventative maintenance will be provided throughout the duration of the project. No equipment will be left in place at the completion of the project. Therefore, no ongoing maintenance considerations need to be addressed.

1.5.5 Safety Considerations:

Special precaution will be required as outlined in existing Rocky Flats procedures and requirements.

1) Pipe removal operations will require HS&E and Tank Survellience Group monitoring because of the possibility of encountering contamination.

2) All personnel working on this project, including those of the Operating Contractor and Construction Contractor, will be fully briefed on HS&E rules and regulations that must be followed to accomplish this project.

3) Radiation monitors will be required on a continuous basis to assure conformance with the Rocky Flats Plant Contamination and Exposure Control rules and procedures, and to prescribe the measures necessary to protect health or to maintain contamination control.

4) Radioactively contaminated materials will be handled in strict accordance with Rocky Flats Plant Waste Management procedures.

5) Excavation for piping and storage tank removal will comply with the Rocky Flats Plant safety regulations and excavation permit procedures. Shoring will be provided to protect personnel

during operations accomplished in the trench.

6) A Safety Analysis Report (SAR) is not applicable for this project since no buildings will be constructed as a part of the work. SAR's are typically used to document safety features considered in building designs.

1.5.6 Security Requirements:

The construction of this project will be performed in compliance with the established Rocky Flats Plant security program. All tasks to be accomplished in security exclusion areas will require the work force to have "Q" access authorizations. For work outside the exclusion areas, Contractors will be required to obtain visitor badges for all employees.

When trenches cross under security fences to allow the removal of abandoned piping, temporary fences will be installed around the trenching area. Temporary fences will be removed when the integrity of the original fence is re-established. In similar fashion when any security device is compromised because of construction, temporary backup systems will be implemented for the duration of that phase of the construction effort.

1.5.7 Outline Specifications and Criteria:

The design of this project will conform to the requirements of the Department of Energy's General Design Criteria, DOE Order 6430.1. Other design standards (i.e., the National Electric Code, the Uniform Building Code, etc.) will be used to augment DOE 6430 when necessary.

Basic performance requirements have been discussed throughout Paragraph 1.5: DESIGN CONCEPT of this report.

1.5.8 Site Development Plan Coordination:

There are no site development requirements for this project.

1.6 QUALITY ASSURANCE:

The Quality Assurance (QA) level for this project shall be level I and level II, as defined by the Quality Assurance Plan developed by the Operating Contractor, included in this report as appendix item 1.12.2: Facility Quality Assurance Plan.

1.7 PROJECT EXECUTION:

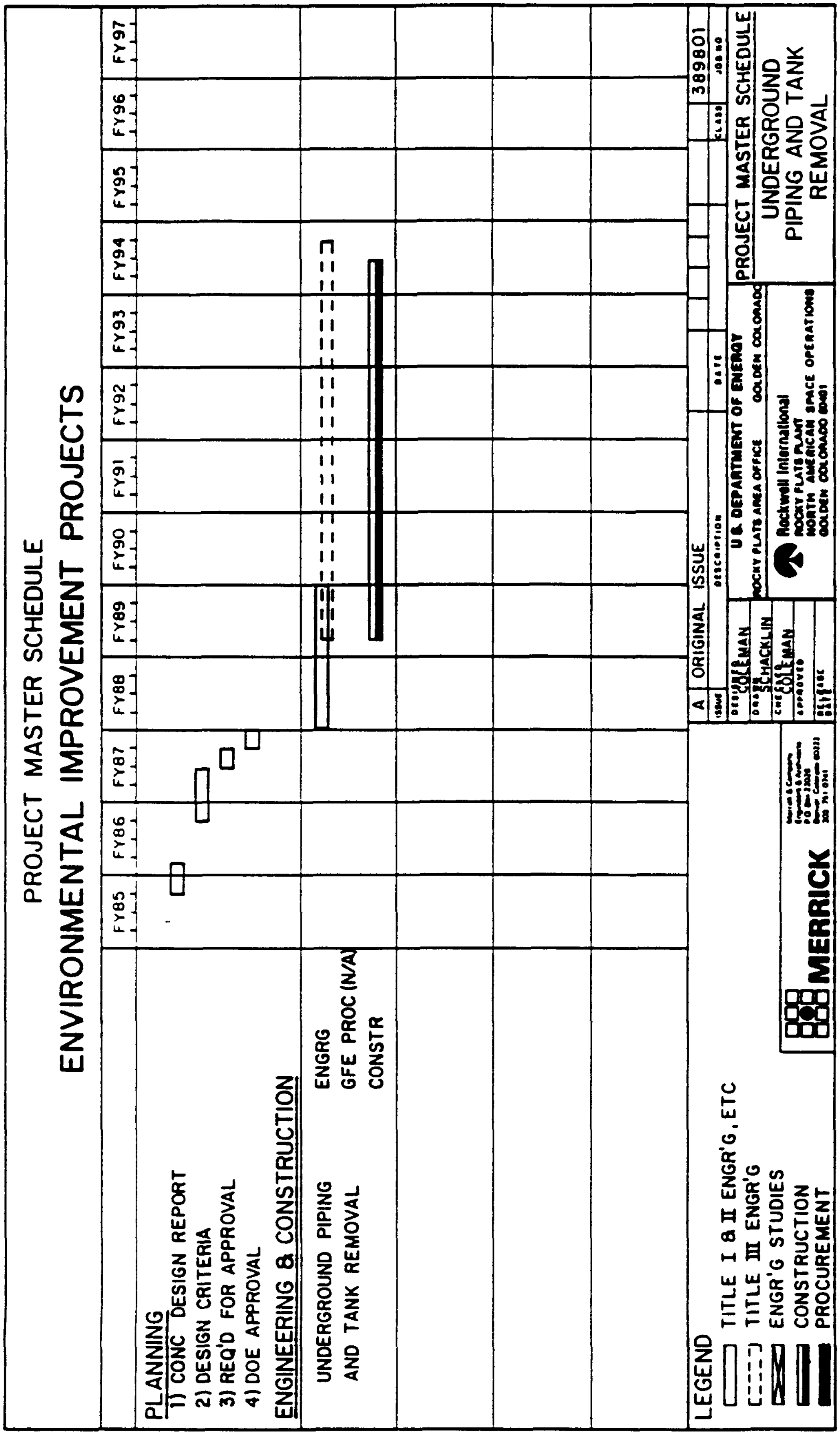
Titles I, II, and III services will be performed by an A-E firm working under a prime, negotiated fixed-price contract with the U. S. Department of Energy.

Due to the anticipated duration of the project, the amount of work to be performed in exclusion areas and work with contaminated substances, construction will be performed by the onsite Cost-Plus-Fixed-Fee Contractor under the direct inspection and health/physics monitoring of the Operating Contractor.

Construction equipment used on the project will be acquired by the Construction Contractor and will be turned over to the Operating Contractor for decontamination and decommissioning at the end of the project.

Boxes used to ship removed soils, piping, and tanks will be approved shipping containers, purchased by the Construction Contractor throughout the performance of the work.

1.8 SCHEDULE:


PROJECT MASTER SCHEDULE
ENVIRONMENTAL IMPROVEMENT PROJECTS
FY85
FY86
FY87
FY88
FY89
FY90
FY91
FY92
FY93
FY94
FY95
FY96
FY97
PLANNING
1) CONC DESIGN REPORT
2) DESIGN CRITERIA
3) REQ'D FOR APPROVAL
4) DOE APPROVAL
ENGINEERING & CONSTRUCTION
UNDERGROUND PIPING AND TANK REMOVAL
ENGRG
GFE PROC (N/A)
CONSTR
LEGEND
TITLE I & II ENGR'G, ETC
TITLE III ENGR'G
ENGR'G STUDIES
CONSTRUCTION
PROCUREMENT
MERRICK
A ORIGINAL ISSUE
COLEMAN
SCHACKLIN
COLEMAN
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN COLORADO
Rockwell International
ROCKY FLATS PLANT
NORTH AMERICAN SPACE OPERATIONS
GOLDEN COLORADO 80401
PROJECT MASTER SCHEDULE
UNDERGROUND PIPING AND TANK REMOVAL
389801

1.9 COST ESTIMATE:

1.9.1 Cost Estimate Summary:
Underground Piping and Tank Removal.

			Project Costs
Engineering, Design, and Inspection at approximately 3.4% of Project Costs---------			$ 900,000
Title I----------------------		$ 200,000	
Title II---------------------		$ 500,000	
Title III--------------------		$ 100,000	
Inspection-------------------		$ 100,000	
Project Costs----------------			$26,500,000
Improvements to Land-------		0	
Buildings------------------		0	
Special Facilities---------		0	
Utilities------------------		0	
Project & Construction Management-----------------		$ 140,000	
Project Administration---	$ 140,000		
Security Escort----------	$ 0		
Decontamination & Decommission------------		26,360,000	
Demolition--------------	7,890,000		
Excavation--------------	5,940,000		
Packaging and Handling--	8,950,000		
Shipping and Storage----	2,050,000		
Backfill and Improvement Repairs-----------------	1,480,000		
Decontamination---------	50,000		
Standard Equipment------------			$ 20,000
Radiation Monitoring----------			4,700,000
Contingency Allowance at approximately 26.5% of above costs----------			8,480,000
Total Project Cost------------			$40,600,000

1.10 PROCUREMENT ACTION:

Major procurement items include contaminated material disposal boxes, contaminated waste disposal transportation, and waste disposal site facilities. The Architect/Engineer will develop waste volume calculations coinciding with the removal schedule to enable the Construction Contractor to arrange for acquisition of the items as they are needed. There is no Government Furnished Equipment (GFE).

1.11 COST AND FUNDING PLAN:

It is anticipated that monies for Title I and II engineering will be obligated in the FY-88 budget year. Title II design efforts will not be complete until late in FY-89. Equipment will be specified and ordered in the budget year, if necessary to meet contruction schedules.

Project Administration will start concurrent with Title I design. Actual removal of contaminated piping and tanks will begin at the start of the second quarter in fiscal year 1989. Title III A-E services and construction inspection will be ongoing during the removal work. Completion of as-built drawings and project close out will extend a short time after completion of the removal work, scheduled to end in the third quarter of 1994.

Appropriations of $1,000,000 in FY 1988 are required to initiate the design on this project; $7,000,000 (FY 1989), $6,600,000 (FY 1990), $6,600,000 (FY 1991), $6,600,000 (FY 1992), $6,600,000 (FY 1993) and $6,200,000 (FY 1994). Funds for the indicated fiscal years are required for construction, equipment, procurement and inspection activities. (refer to Figure 8 for a cost and funding profile).

COST AND FUNDING PROFILE
Underground Piping and Tank Removal

TEC 40,600 a/
(includes Titles I, II and III)

		FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994
Titles I and II	Obligations	700	0					
	Costs	500	200					
Title III/Insp	Obligations		200	0	0	0	0	0
	Costs		30	40	40	30	30	30
Equipment	Obligations		20					
	Cost		20					
Decon/Decom	Obligations		4,480	4,440	4,440	4,440	4,440	4,120
	Cost		4,480	4,440	4,440	4,440	4,440	4,120
Const/Admin	Obligations	20	20	20	20	20	20	20
	Costs	20	20	20	20	20	20	20
Monitoring	Obligations		810	800	800	800	800	690
	Costs		810	800	800	800	800	690
Contingency	Obligations	280	1,470	1,340	1,340	1,340	1,340	1,370
	Costs	80	1,540	1,300	1,300	1,310	1,310	1,640
Rounded Totals	Obligations	1,000	7,000	6,600	6,600	6,600	6,600	6,200
	Costs	600	7,100	6,600	6,600	6,600	6,600	6,500

a/ All tabulated dollar amounts are given in thousands All costs are escalated using the "Anticipated Economic Escalation Rates for DOE Construction Projects" developed by the Independent Cost Estimating (ICE) staff and updated in August 1985 Engineering design costs are escalated to the midpoint of Title I/II design Equipment costs are escalated to the date of procurement Construction costs are escalated to the midpoint of construction

FIGURE 8

1.12 SUPPORTING APPENDICES:

1.12.1 Drawing Lists:

The following drawings are attached:

Sheet	Drawing	Title
		Underground Piping and Tank Removal
1	D-37348-CX1	Index and Title Sheet
2	D-37348-C01	Site Plan
3	D-37348-C02	Piping Partial Abandonment Plan No. 1
4	D-37348-C03	Piping Partial Abandonment Plan No. 2
5	D-37348-C04	Piping Partial Abandonment Plan No. 3
6	D-37348-C05	Piping Partial Abandonment Plan No. 4
7	D-37348-C06	Piping Partial Abandonment Plan No. 5
8	D-37348-C07	Piping Partial Abandonment Plan No. 6
9	D-37348-C08	Piping Partial Abandonment Plan No. 7
10	D-37348-C09	Piping Partial Abandonment Plan No. 8

1.12.2 Facility Quality Assurance Plan:

PROJECT AND AUTHORIZATION NO.: Environmental Improvement Projects No. 389801

1.12.2.1 Quality Assurance Level:

(QAL or QA Level) Assignments and Specific Requirements:

The following items need to be addressed and included with each project:

1.12.2.2 QAL or QA Level Assignments:

Systems conveying/controlling/sensing radioactive materials, environmentally-threatening substances and other hazardous, toxic or life-threatening substances shall be QAL I and QAL II as determined by the Project Engineer.

1.12.2.3 Radiation Contamination and HS&E Documentation

Documentation of the existence and the degree of the encountered contamination shall be included in the project file.

Any documentation generated as a result of instituting the necessary HS&E procedures shall be included in the project file.

1.12.2.4 Disconnects and Tie-Ins:

All service and utility disconnects and tie-ins shall be accomplished during normal working hours to the greatest extent feasible and shall be scheduled to minimize downtime and interruption of other facilities. It shall be necessary that the Construction Contractor schedule his work with the Contracting Officer (assisted by the Operating Contractor's, Construction Management (CM) Group) prior to the beginning of demolition and construction work.

1.12.2.5 Seismic:

New equipment shall be designed and documented for appropriate seismic forces specified in Rocky Flats Standard SC-106 and FE Manual 014.

Pipe supports shall be designed and documented for seismic forces.

1.12.2.6 Welding:

All welding for these projects shall be performed by welders who have been certified to the approved qualification procedures for the metals and plastics to be welded.

Documented Welding Procedures and Welding Qualification Records shall be submitted to the Contracting Officer for approval prior to the start of any welding.

1.12.2.7 <u>Component Checkout (CC) and System Operating (SO) Tests</u>:

A Component Checkout test checklist and test procedure shall be prepared and included with the specifications. The CC tests shall be performed by the Construction Contractor. The CC tests shall be completed before "Beneficial Occupancy." System acceptance shall be based on SO test procedures.

1.12.2.8 <u>Material and Equipment Certification</u>:

Mill test reports (MTRs) shall be required and MTR traceability is required on pipe fittings, valves and similar pressure-containing material. Traceability shall be 100 percent on all QAL I and QAL II components and material.

Certification documentation from the manufacturer showing that purchsed equipment meets the specification requirements shall be supplied to the Operating Contractor prior to final acceptance.

1.12.2.9 <u>Receiving Inspection and Procurement</u>:

A receiving inspection shall be required for all Government Furnished Equipment (GFE) and Contractor Furnished Equipment (CFE). This inspection shall comply with the requirements of the Receiving Inspection Procedure contained in the Quality Program Procedure Manual, Procedure Q1407. Suitable inspection checklists shall be available for use as part of the receiving inspection/procurement process on both GFE and CFE. Proper sign-offs by the responsible personnel shall be affixed and the inspection reports then filed in the project file. The specifications shall address receiving inspection.

Proper documentation shall be provided on the inspection of certifications, mill or material test reports, etc., during the receiving inspection. Heat numbers shall be verified as well as any other material identification documents.

1.12.2.10 <u>Inspection and Coordination</u>:

Construction coordination and inspection by CM shall be required on these projects, and shall comply with the requirements set forth in Section V of <u>Procedures - Facilities Engineering</u>. The specficiation shall address this activity.

1.12.2.11 <u>Configuration Control</u>:

Some systems indicated herein should be under configuration control after final occupancy has been established.

1.12.2.12 Project Status Reviews:

Review meeting notes shall be written and distributed to those involved. Such notes shall be used for documentation of important matters and decisions. This form of communication and information is considered vital to control the design, quality and safety aspects. This is considered good quality assurance. All meetings should be documented.

1.12.2.13 Flow Diagramming for Quality:

A critical path flow diagram indicating procurement, receiving inspection, certification review, warehousing and other vital processes/procedures to prove reliability claims and control of quality is recommended.

1.12.2.14 NDT and Pressure Tests:

Piping shall be hydrotested per SP-201 which should include utility, process and similar systems.

Pipe welds shall be NDT tested for discontinuities with liquid penetrant inspection (PT) to prove weld quality unless radiographed for QALs I and II.

1.12.2.15 As-Builts:

After job completion, drawings shall be updated to "AS-BUILT" conditions and should be maintained for the life of the systems/facilities.

1.12.2.16 Miscellaneous:

"Letters of Compliance" or "Certification of Compliance" should not be considered an alternate for mill or material test reports where applicable.

Defined life on instrument controls and major equipment items should be included.

Overall, the Facilities Quality Assurance Program Manual applies.

Pumps shall have defined design life with pump curve certification.

The information contained herein contains the quality assurance requirements for the projects. These requirements should be considered as a minimum. Upgrading of these requirements may be directed at any time.

1.12.3 Cost Breakdown: Underground Piping and Tank Removal

Line Item Costs	Break Down (x 1,000)	Unit Cost (x 1,000)	Item Cost (x 1,000)	Total Cost a/ b/ (x 1,000)
a. Engineering, Design, and a\ Inspection at approximately 3.4% of Project Costs, Item b.				$ 900
b. Project Costs				26,500
(1) Improvements to Land			$ 0	
(2) Buildings			0	
(3) Special Facilities			0	
(4) Utilities			0	
(5) Project and Construction Management			140	
Project Administration		$ 140		
Security Escort		0		
(6) Decontamination and Decommission			26,360	
Demolition - Pipe Removal		7,890		
Material	$ 0			
Labor	5,460			
Equipment	10			
Escalation	2,420			
Excavation		5,940		
Material	0			
Labor	4,090			
Equipment	30			
Escalation	1,820			

Line Item Costs	Break Down (x 1,000)	Unit Cost (x 1,000)	Item Cost (x 1,000)	Total Cost a/ b/ (x 1,000)
Packaging and Handling		$ 8,950		
Material	$ 5,400			
Labor	810			
Equipment	0			
Escalation	2,740			
Shipping and Storage		2,050		
Material	10			
Labor	10			
Equipment	1,400			
Escalation	630			
Backfill and Improvement Repairs		1,480		
Material	970			
Labor	20			
Equipment	30			
Escalation	460			
Decontamination - Equipment		50		
Material	0			
Labor	30			
Equipment	0			
Escalation	20			
c. Standard Equipment				$ 20
d. Radiation Monitoring				4,700
Subtotal				$32,120
e. Contingency Allowance at approximately 26.5% of above				8,480
Total Project Cost b/				$40,600

a/ Estimate based on 100% complete conceptual design.

b/ Costs were escalated using the "Anticipated Economic Escalation Rates for DOE Construction Projects" developed by the independent cost estimating staff. Engineering and design costs were escalated to the midpoint of Title I/II design. Equipment costs were escalated to the order date. Construction costs were escalated to the midpoint of construction.

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SURVEY OF THE STATUS OF THE EXISTING PROCESS WASTE LINES

By
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Prepared for

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Rocky Flats Plant
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September 1, 1976

REVIEWED FOR CLASSIFICATION
By F J TRAPP MGR P.I
Date 12-8-76

TABLE OF CONTENTS

I. INTRODUCTION

Recent changes of philosophy on the subject of environmental control at the Rocky Flats plant have led to changes in the handling of process waste. In the past, leak detection in pipelines has been extremely difficult or inaccurate, delaying necessary repairs In conjunction with the construction of a new aqueous waste treatment plant (Building 374), a new process waste line has been installed which is doubly-contained, providing a secondary barrier to contain leaks This new system is also completely inspectable

Rather than simply abandoning the old lines, it becomes necessary to concern ourselves with the condition of the original process waste collection system. These lines are not only uninspectable, but have been in heavy use, in part, for 25 years and have required numerous repairs and modifications in that time. It is possible that some portions of these lines may present a residual hazard after being placed in idle status. Varying conditions may require more extensive actions than simply flushing and sealing the lines In the extreme, filling or complete removal may be necessary

In response to a request made by J. A Watt, ERDA-RFAO, in the fall of 1975, an outline was initiated by B L Kelchner of Waste Processing to define the data needed to analyze the problem.

The following engineering study is a collection of information concerning the existing process waste collection system which will be removed from service and ultimately abandoned when the new waste treatment facility is operative In order to assist in making a judgement concerning the disposition of these lines, data has been tabulated that includes: line sizes, location, age, materials of construction, operating data, and unusual operating incidents. To supplement the criteria concerning possible environmental hazards, soil samples were taken and analyzed in areas of known leaks and repairs. The final step in the study was a library search for new developments in the area of pipe cleaning. This study includes lines buried in the field and waste collection tanks, both inside and out of the buildings.

II. SUMMARY

The purpose of this study was to gather pertinent data for use by qualified consultants rather than to state conclusively the final disposition of these lines However, a few general observations are the natural consequence of any exposure to analytical data As the study progressed, some conclusions became obvious which might be helpful in minimizing the complexity of the problem.

One major factor in considering abandonment of any of the lines is that several times in the past, leaks have been caused by equipment accidentally breaking into a line. It is likely that, once the lines are no longer in use, consciousness of their existence will become increasingly obscure. Filling of these abandoned lines with some inert material would confine contaminants if future construction activities should damage the lines.

One example where removal would be both practical and desirable is the old saran-lined pipe than runs between 881 and 707 The line was installed in 1952 and has had heavy usage and numerous repairs since that time Since the line is doubly-contained, removal of the 3" inner saran-lined steel pipe could be accomplished without excavation by pulling the line through the 10" vitrified clay pipe casing Waste treatment personnel, under the direction of M. E Maas have already successfully removed 120' of the line in this manner Because the line was, at that time, the only means of transferring process waste from the south side of the plant to 774, no attempt was made to remove the longer pieces of line. Since the line was abandoned in 1975, this method would be an economical, expedient way to eliminate one area of concern

An area where a strong argument could be made for abandonment in-place is the line running east-west between 444 and 883. Although the line is old and pipe material is cast iron, it has carried only very small amounts of depleted uranium and nitrates. A soil sample at the location of the only known break in the line was found to contain 62 ppm NO_3 Plutonium 239 is near background level at this same location.

Soil samples were obtained from areas known to be contaminated as a result of leaks. The soil sample results indicate that pipeline removal would not require removal of surrounding soil. Assuming that these soil sample results are typical, they do not by themselves constitute a basis for removal of the lines. It should be noted that the samples taken from the 700 Area (samples 4-9) are above plutonium background level which is approximately 0.03 d/m/g. The two taken in the south part of the plant (samples 1-2) are closer to background. An expanded soil sampling program would define the boundaries within which contamination levels are higher than normal.*

Although there are no established levels for nitrates in soil, the sample results are not high They do verify that there has been leakage *

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*Evaluation of the soil sample analysis was made with the help and direction of Merlyn R Boss and Daryl D Hornbacher of Health and Environmental Science

Disposition of lines in the 700 Area will require careful consideration. Decisions should be made on a case by case basis. After the process waste lines are no longer in use, samples taken from the inside of the lines would be very helpful in gauging any residual hazards. The description of these lines contained in the process waste lines section of this report and the process waste summary should be helpful in determining the condition of these lines.

III. PROCESS WASTE STREAMS

These streams originate from production and research activities and laboratory, laundry, decontamination, and janitorial operations. Aqueous chemical and radioactive waste are generated in Buildings 123, 444, 707, 771, 776, 779, 865, 881, 883, and 889. Each tank of waste is sampled before shipment and, depending on the level of radioactivity and chemical composition, can be routed to Building 774 for treatment, Pond B-2 on South Walnut Creek, or the solar evaporation ponds, Facility 207 Average volume and level of contamination have varied over the years as various building operations have been changed. Usage, in general, has been high and both lines and tanks normally contain liquids. Monthly averages covering all years the plant has been in operation are listed in Appendix 2 for each building.

IV. PROCESS WASTE HOLDING TANKS

To be consistent with the current philosophy on environmental protection at the Rocky Flats plant, process waste holding tanks must be made double-contained and inspectable Some have already been modified by placing a new tank inside the old one Others are under authorization as part of construction projects to be made doubly contained

In 1971, several sample wells were drilled around the buried tanks so that they could be regularly monitored for releases to the environment. Twice a year, liquid samples are taken from the sample wells and they are analyzed for plutonium, americium, uranium, and nitrates by the Health and Environmental Science Laboratories.

In assessing any potential environmental hazard, Appendix 2 will be helpful The highest level of contamination and usage history of each building's process waste is listed. This is, of course, the same waste that has been carried by the process waste lines Tank material, capacity and age are tabulated in the table included in this section of the study

PROCESS WASTE HOLDING TANKS

Bldg	Location, Depth	Name/No	NI (2)	Capacity (gallons)	Dimensions (feet)	Material	Age (years)	No /Mo (1)	Notes
889	In pit W of bldg , 15' deep	/2	x	1,000	5x7x4 25	concrete with carbolene lining	10	3 in 6 mos	to be made double contained under Auth 385050
776	N of 776 (N 37080 E 20911 5), 26'	A&B/2	x	22,500	25x15x10	concrete	20	5	
		C&D/2	x	4,500	5x15x10	concrete			
771	N of NE corner of bldg , 18'	A&B/2	x	20,000	22x15 5x7 5	concrete	23	2	
707	E side of 707 (N 37080 E 20911), 20'	2		3,000		fiberglass	2	5	placed inside old concrete tanks
865	located on the first level, Column C-4, 15'	2	x	3,000		concrete	6	6	to be double contained, Auth 385050
779	basement level, Column C-5, 10'	1A&1B/2	x	8,000	22x9x7.5	concrete	11	1	to be double contained, Auth 375030
		2A&2B/2	x	1,000	5x9x7 5	concrete	11		
444	basement level, Col F, E-6, 7	T2-T3/2	x	3,500	7 5x12 5	steel	23	17	to be made double contained, Auth 385050
		2	x	500		concrete with floor drain	23		
122	SE of bldg , underground	1	x	800		stainless steel	23	7	
887	lower level	7		2,700		stainless steel	23		
881	Room 114A	4		250		stainless steel	23	7	2 for caustics 2 for HNO_3 & Be
559	in holding pit SE of bldg	1&2/2		1,800	7x9	stainless steel	10	2	
		3/1		500	3 5x8	stainless steel	10		
883	basement - Room 1	2		1,000		welded steel	10	3	
		2		1,000		welded steel			
		1		750		welded stainless steel			
886	18 feet W of bldg	1		300		steel			aboveground, transported by portable tanks

PROCESS WASTE HOLDING TANKS (continued)

Bldg	Location, Depth	Name/No	NI (2)	Capacity (gallons)	Dimensions (feet)	Material	Age (years)	No /Mo (1)	Notes
441	S of bldg (holds 123 process waste), 6'8"	1	x	3,000	13 25x13		23	7	
774		2	x	14,000				30	
		1	x	30,000					

(1) Present number of tank shipments per month Based on first five months of 1976

(2) Not Inspectable

V. PONDS

Low-level waste from the buildings and filtrate from the Building 774 second stage operations are sent either to the solar evaporation ponds, 207-A, B, C or discharged off-site to Pond B-2 on South Walnut Creek.

In the Process Waste Summary, Appendix 2, 207-A, B are referred to as 2-A and 2-B, respectively These were the original terms used to identify these ponds

Of the ponds on South Walnut Creek, only one is used for process waste. It was previously the Building 995 Pond (later called Pond 3). It is now Pond B-2.

Solar Evaporation Ponds	Dimensions (ft)	Capacity (gal)
207-A	521 x 250	Operational - 5,112,000 Overflow - 6,155,000
207-C	248 x 168	Operational - 1,286,000 Overflow - 1,673,000
207 B-1	*250 x 181	Operational - 1,583,000 Overflow - 2,188,000
B-2	*250 x 181	Operational - 1,705,000 Overflow - 2,310,000
B-3	*250 x 181	Operational - 1,710,000 Overflow - 2,315,000

*Depths vary

S Walnut Creek Ponds	Type of Waste	Capacity (gal)
B-2	Laundry Waste	1.9×10^6
B-1	Sanitary Waste	0.8×10^6
B-3	Sanitary Waste	0.9×10^6
B-4	Sanitary Waste	0.6×10^6

VI PROCESS WASTE LINES

The process waste lines presently in use vary greatly in age, material and usage history Consequently, any decision concerning their ultimate disposal will vary from line to line.

In general, the system is gravity-flow and vented so the lines have not been subject to any pressure The line coming from Building 444 to Building 883 is pumped but is essentially at atmospheric pressure due to its large 4" diameter and the low volume of waste carried from this area. The line coming from 881 north to 883 is also pumped but pressure should not exceed about 10 psi.

The only thermally hot waste coming through the lines has been steam condensate from Building 881 Although the temperature should not have affected the saran-lined steel used in this line, the steam condensate is believed to be the probable cause of numerous leaks at the 45° elbows of the lines. The steam caused expansion in the flanges which allowed acids in the waste to corrode the outer mild steel (For more information, see Appendix 1-A 2,)

The following table is a collection of data concerning the process waste lines which will be superseded by the new, double-contained system. Line sizes, length, age, and materials of construction have been tabulated The operating data and leak information are contained in the appendices The last column of the table refers to the appendix which contains information pertinent to each line

OUTSIDE PROCESS WASTE PIPES

General Location	Pipe Material	Pipe dia (inches)	Total Feet	Year Installed	Usage, Leaks, and Repairs
See Appendix 4-Dwg 15507-1					
400 Area					
exits S side of 123, ends at E18623 5	polyethylene in steel	3 inside 4	120	1968	see Appendix 2, bldg 123
begins E18623 5, enters 441 at N36081 8	vitrified clay	4	162	1952	see Appendix 2, Bldg. 123
begins 441 tank, connects 441, 444 & 883 (N36056)	cast iron	4	1,193	1952	see Appendix 2, Bldgs 123, 441, & 444, see Appendix IA, III, & IV
800 Area					
connects 881 to valve pit W of 884 (N36232 E20560)	steel	3	865	1957	see Appendix 2, Bldg 881
connects 883 to valve pit W of 884	steel	3	504	1957	see Appendix 2, Bldg 883
exits S side of 881, connects 81 & 89	stainless steel	2	78	1952	see Appendix 4, Dwg. 15507-1 Detail 1
exits S side of 881, connects 81 & 89	stainless steel	3	140	1952	and Appendix 2 Bldg 881
exits S side of 881, connects 81 & 89	stainless steel	4	158	1952	
connects 865, 889 to N36191, E20560	stainless steel	3	550	1968	see Appendix 2, Bldg. 865 & 889 see Appendix 4 Dwg 15507-1 Detail 2
Main north-south line (E20560)					see Appendix 2, Bldgs 881, 865 889, 883, 441, 444, & 123
begins valve pit W of 884, to just N of Central Avenue	new FG inside old VCP	3 inside 10	165	FG 1975 VCP 1952	see Appendix IA-1
N of Central to valve pit W of 707 (N36910)	3" saran-lined steel in 10' VCP		573	1952	see Appendix IA-1
N of Central to valve pit W of 707 (N26910)	3" ribbed hose in 4" FG reinforced epoxy		523	1975	
begins valve pitW of 707, ends N707 (E21058)	stainless steel	3	878	1968	see Appendix 2, Bldgs 123, 444, 559, 707, 865, 889, 881, & 883
diagonal (N36910 E20560 to N37370 E21058) then N to N36581 E21058	3' saran-lined steel in 10" VCP		942	1952	see Appendix 2, Bldgs 441, 444, 123, 881, 883 (abandoned 1968), and see Appendix IA, II

OUTSIDE PROCESS WASTE PIPES (continued)

General Location	Pipe Material	Pipe dia (inches)	Total Feet	Year Installed	Usage, Leaks, and Repairs
559 Area					
exits E side of 561 (N37072), connects to main line (E20560)	polyvinyl chloride	3	170	1968	see Appendix 2, Bldg 559
exits SE side of 559 (N37124 E20370) enters NE 559 (N37216 E20406)	glass	4	135	1968	see Appendix 2, Bldg 559
exits S of 559 (E20278), enters W of 561 (N37071 5)	rigid teflon	2 3/4	150	1968	see Appendix 2, Bldg 559
See Appendix 4 Dwg 15507-2					
700 Area					
N 707 (N37292 E21058) to N 777 (N37681 E20990)	stainless steel	3	455	1968	see Appendix 2, Bldgs 123, 444, 559, 707, 865, 883, 889, & 881
N 777 to Bldg 774 (enters W side at N38025)	stainless steel	3	336	1952	see Appendix 2 all bldgs except 771
E 707 (N37132) to N 707 (N37284)	stainless steel	3	186	1968	see Appendix 2, Bldg 707
exits N 771 (E20588) to 771 tanks (N38207)	cast iron	6	85	1966	see Appendix 2, Bldg 771
771 tanks to reducer N of 774	cast iron	6	180	1966	see Appendix 2, Bldg 771 & Appendix IB & III
reducer N of 774 to valve pit N of tank 207 (N37820)	stainless steel	3	516	1972	see Appendix 2, Bldg 771 & Appendix IB & III
See Appendix 4 Dwg 15507-2					
700 Area					
774 to N37931 E21077	stainless steel	two 3" pipes	185	1968	see Appendix 2 treated waste from 774 to ponds
N37931 E21077 to valve pit N of tank 207	stainless steel	two 3" pipes	111	1972	see Appendix IB-1
tunnel between 771 & 774	plastic hoses	three 1" pipes two 2" pipes			see Appendix 2, 771 into 774 first stage
exits N 776 (E20769 5) to 776 tanks	cast iron	6	72	1957	see Appendix 2, Bldg 776
776 tanks to Ponds (N37715 3)	steel	3	1,055	1957	
776 tanks to valve pit N of 207 (N37820)	stainless steel	3	402	1957	see Appendix 2, Bldg 776
exits W side 779 (N37552) to valve pit N 77 (N37715 E21056)	stainless steel	3	164	1957	see Appendix 2, Bldg 779
779 to valve pit N of 777	stainless steel	3	44	1957	
W 771 (N3791) to 771 tanks (N38207)	fiberglass	10	395	1969	see Appendix 2, Bldg 771
lines around tank 207	steel	3	230	1965	
	vitrified clay pipe	4	153	1952	
	vitrified cl[illegible]	6		1966	

OUTSIDE PROCESS WASTE PIPES (continued)

General Location	Pipe Material	Pipe dia (inches)	Total Feet	Year Installed	Usage, Leaks, and Repairs
Ponds					
exits E 774 (N38075) to Pond 207-A	polyvinyl chloride	two 1 5"	~1,500		see Appendix 2
valve pit NE of tank 207 to off site (E23700)	vitrified clay pipe	10	~ 660		
	vitrified clay pipe	6	~2,190		
from N37335 E22652 to N37287 E23239	vitrified clay pipe	6	~ 590		abandoned see Appendix 2, Bldg 774 to Bldg 95 ponds
from valve pit NE of tank 207 (N37713 E21050) to ponds 207 A & B	steel	3	~1,190		
connects 207 & 207 A	cast iron	8	85		

VII. APPENDICES

Appendix 1-A and 1-B describe leaks and repairs 1-A is crossreferenced to Drawing 15507-4 in Appendix 4 1-B is crossreferenced to Drawing 15507-5 in Appendix 4 Appendix 2 is a summary of the wastes carried by the lines over the years. Appendix 3 contains the results of eight soil samples taken in areas of possible contamination from leaks. These areas are also marked on the drawings in Appendix 4. The first columns of the Process Waste Lines Table locate the piece of line being described. Reference points and coordinates refer to the drawings in Appendix 4

APPENDIX 1-A - LEAKS AND REPAIRS
(Notes on Drawing 15507-4)

A. The line between the 884 valve pit and the valve pit east of Building 557 (guard station) was found to have a leak rate of 2.7 gal/hr at 20 psig (65 gal/day) in May 1971 by International Leak Detection Services in Houston, Texas. This line (E20560 from N36232 to N36910) is 3" mild steel lined with saran and encased in a 10" vitrified clay pipe. The line was installed in 1952 and abandoned in 1975. The remaining piece of line (going from the valve pit of N36910 to the valve pit east of Building 557) is 3" stainless steel and was placed in 1968 The first 120' north of the 884 valve pit was repaired as follows: the 10" VCP containment was kept in place but the inner 3" saran-lined pipe was replaced with a 3" ribbed hose. Just north of Central Avenue (even with the concrete anchor for the power pole) a new double-contained line (3" ribbed hose in 4" FG-reinforced epoxy) jogs to the west of the old line about 4 ft. and continues north, parallel to the abandoned 3" saran-lined pipe and 10" VCP containment A soil sample and clay tile pipe sample taken in May 1972 (Report PRD 950463-107) of the abandoned line showed no measurable amount of contamination and a visual inspection showed only surface rust Some bolts at the flanges were tested and found to be in good condition. A soil sample was taken for this study at the 884 valve pit (see Appendix 3 for a sketch) Analysis results showed Pu^{239} - 0.049 d/m/g and NO_3 - 110 ppm

B There is an abandoned line from the valve pit at N36910 E20560 (West of 707) running at a diagonal to the northeast and ending at N37370 E20990 The line is 3" saran-lined steel in 10" vitrified clay containment

A large portion of it lies under Building 707 which was built after the line was abandoned in 1968. Substantial leaks occurred at the elbow connections during its use due to expansion from steam condensate from Building 881. Leaks of acidic process waste resulted in corrosion of the outside mild steel. The abandoned line continues north from the joint at N37370 E20990 and is buried beneath Building 777. It is probable that portions of all this line were removed as excavation for 707 and 777 made necessary. One bad leak occurred in December of 1958 when the south 45° elbow broke and process waste followed the containment pipe to the north 45° elbow and leaked into a ditch. From Building 881, 2,700 gallons of lab waste (radioactivity .51 ppm enriched uranium, pH 5.6, NO_3 120 ppm) and 2,700 gallons of laundry waste (radioactivity .51 ppm enriched uranium, pH 9.4) was sent and 1,350 gallons were received in 774. The elbow was repaired and the line remained in use for another 10 years A soil sample taken for this study at the valve pit west of 707 (see Appendix 3, soil sample #4) showed Pu^{239} - 0.145 d/m/g and NO_3 - 54 ppm.

C The east-west line running at N36030 and connecting Buildings 122, 123, and 444 to a junction with the north-south line west of Building 883 is the original 4" cast iron pipe with bell-and-spigot construction and is about 23 years old. Significant leaks were found in the joints by International Leak Detection Service in 1971 Leak rate was determined to be 2 5 gal/hr at 37 psig The line itself seemed to be intact and the joints were repacked to stop further leakage The line was tested under pressure greater than that normally found under ordinary working conditions Report PRD 950463-107, May 1972 by Hornbacher and Lott describes the problem and repair in detail

D. A break in the line close to the driveway of Building 663 occurred around 1960 to 1962. The line chipped as trucks backed over the shallow cover and the leak was detected as water bubbled to the ground surface. A small portion of the line was replaced and no subsequent leaks were reported.

E. A piece of line right under the outside perimeter road (this line goes off-site to Pond B-2) was broken by a cable-laying operation and recovered. The leak was detected by excess water in the culvert and subsequently repaired by replacing a piece of the line.

APPENDIX 1-B - LEAKS AND REPAIRS
(Notes on Drawing 15507-5)

A. The two parallel lines running between 774 and the valve pit north of tank 207 were found to be leaking badly in the old cast iron sections The 3" line had a leak rate of 14 gal/hr at 20 psig. The parallel 4" line had a leak rate of 45 gal/hr Both were replaced in April 1972. Soil sample #8 taken east of the valve pit north of tank 207 showed Pu^{239} - 1.83 d/m/g, NO_3 - 76 ppm.

B The valves on the north of 777 (N37715 E21055) were found to be leaking in 1971 at a rate of 25 gal/hr at 20 psig. A valve pit was constructed in May 1974. Soil sample #6 showed Pu^{239} - 0.05 d/m/g, NO_3 - 105 ppm.

North of the new waste packaging facility joining 771 and 774, a leak rate of 15 gal/hr at 20 psig at the junction of a 6" cast iron with a 3" steel line was found in 1971 by International Leak Detection Services The 3" steel has since been replaced with a 3" stainless steel line when the waste packaging facility was added in 1972. Soil sample #9 was analyzed to contain Pu^{239} - 3.385 d/m/g and NO_3 - 44 ppm

APPENDIX 2 - PROCESS WASTE SUMMARY

These data were taken from the records of shipments to and from Building 774 kept by M. E. Maas, Waste Treatment Supervisor. The records were summarized to find the highest concentrations of radioactivity and chemical contamination that have been present in the process waste lines and tanks. Because of the huge amount of data and time limitations, approximately one-fourth of the data was selected to be tabulated. In most cases, there was little variation in monthly volumes and three months were picked at random (usually January, May, and October). When a marked change was noticed in usage, the month with the highest total volume was used. At times, it was possible to scan the entire year and total the volume. Those places have been marked as yearly totals.

Units and notation are the same as in the original records. The notes which clarify which substances are referred to in the activity column were given by Bob Carpenter, Assistant Manager of General Labs

APPENDIX 2 - PROCESS WASTE SUMMARY

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774

Bldg	General Types and Levels of Contamination	Year	Monthly Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
441	Lab waste - low level activity is total	1953	31,300	3 2 ppm				
	uranium with 98% depleted uranium	1954	17,800	4,600 d/m/l				
		1955	14,900	01 gu/l	1,066			
		1956	12,600					
		1957	9 600					
		1958	16,000					
		1959	16,530					
		1960	27,900					
		1961	30,300					
		1962	30,500					
		1963	39,700					
		1964	17,600					
		1965	21,800					
		1966	27,200					
	Converted to office building in 1967							
883	Janitor water and process waste	1959	3,300	3 3 gT/l	146 ml			
	Total gallons for year	1960	2,600	3 9 gT/l				Th<100 ppm
	Total gallons for year	1961	400	1 02 gT/l				
	depleted uranium	1973	2,800	46 x 10^6 d/m/l	5,800	30 9	4-9 8	Be 1 ppm
		1974	5,100	33 x 10^6 d/m/l	182,000			
		1975	3,200	30 x 10^6 d/m/l			<1-13 0	U238-4600 ppm
		1976	950	1 4 x 10^6 d/m/l				6-9.4
881	Laundry waste, process & lab waste, caustic	1953	52,430	060 ppm			1 0-2 5	] 28,700
		1954	43,580	34 ppm	103,750		2 0-11 5	F 126,000
	95% enriched uranium U-235	1955	69,960	1 22 ppm	440,000		5 3-12 0	Cr 20

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774 (continued)

Bldg	General Types and Levels of Contamination	Year	Monthly Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
		1956	74,230	48 ppm	409,000		0-12	
	This is the only building that sent some	1957	16,800	4 9 ppm	20,500		2 5-11 7	F 20,200 I 14,000
	that sent some thermally hot waste through	1958	79,230	76 ppm	900		3 1-12 3	Cr^{+6} <1
	the lines in the form of steam condensate	1959	27,130	14 0 ppm			6 5-11 1	
		1960	82,100	19 ppm	<100		3 2-12 0	
		1961	138,800	1 6 ppm	860		3 0-12 0	
		1962	60,830	58 ppm	350		2 2-12 2	
		1963	123,600	1 4 ppm	400		2 4-12 0	
		1964	129,400	1 2 ppm	545		2 4-12 3	
		1965	90,920	3 ppm	435		3 1-11 9	
	Year total volume	1966	64,800	1 8 ppm	19,000		1 3-6 8	
		1967	54,900	1 3 ppm	17		2 4-9 4	
		1968	65,230	1 92 ppm	4,800		1 8-11 7	
		1969	4,500	12 6 ppm	11,800		1 5-12 3	
		1970	2,700	35 ppm	116		3 3-3 5	

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774 (continued)

Bldg	General Types and Levels of Contamination	Year	Monthly[3] Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
		1971	4,500	11 ppm	1,660			
		1972	24,660	10^7 d/m/1	25,800			1 7×10^6 d/m/1 Pu
		1973	7,630	210,000 d/m/1	2,870			6,900d/m/1Pu U235-.7 ppm U238-150 ppm
		1974	19,560	600,000 d/m/1	9,000			170,000 d/m/1 Pu U235-3.3 ppm U238-210 ppm
		1975	3,130	2 7 x 10^5 d/m/1				310,000 d/m/1 Pu U235-.64 ppm U238-155 ppm
		1976	6,200	1 7 x 10^6 d/m/1[1]				220,000 d/m/1 Pu U235-3 5 ppm U238-1300 ppm
444	Process waste - depleted uranium	1953	28,230	240 ppm	8,750		8 2-9 4	Fe 60 ppm
		1954	16,700	416 ppm	72,000		6 9-8 4	Fe 0 CO_3 144 ppm
		1955	22,300	267 ppm	4,000		7 4-10 8	Fe 55 ppm
		1956	30,700	2 18 gT/1[2]	2,400		2 4-11 1	Fe 90 ppm
		1957	47,100	52 gT/1			10 5-12	
		1958	87,600	106 gT/1	205		9-12	Fe 85
		1959	41,200	129 gT/1	92	19	10 5-12	Fe 47
		1960	43,670	01 gT/1	<10		11-12 5	
		1961	47,670	028 gT/1	165		10 5-12 0	
		1962	41,670	0039 gT/1	775		9 0-12 3	
		1963	61,600	0158 gT/1	122		3 1-12 5	

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774 (continued)

Bldg	General Types and Levels of Contamination	Year	Monthly[3] Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
		1964	59,030	019 gT/l	173		2 6-11 6	
		1965	41,300	044 gT/l	435		3 7-11 3	
		1966	61,000	051 gT/l	732		3 8-11 3	
		1967	17,910	029 gT/l	19	< 05	3 4-8 6	
		1968	41,700	25 gT/l	9 5	< 05	2 8-11 9	
		1973	4,900	110,000 d/m/l	<5	105	2 1-13 2	
	Year total	1974	3,600	28,000 d/m/l	10	< 05	8 2	
		1975	3,470	77,000 d/m/l	76	1	2 9-9 9	PO_4 12 ppm
	Year total	1976	2,300	5,600 d/m/l			9 9	
559	Lab waste - activity refers to plutonium	1969	4,960					
		1970	9,550					
		1971	4,450					
		1972	5,120					
		1973	3,430					
		1974	1,770					
		1975	3,630					
		1976	1,800	$8\ 5 \times 10^6$ d/m/l				$6\ 31\times10^{-5}$ g/l-Pu $<4\ 29\times10^{-6}$ g/l Am

1 = total alpha in disintegrations/minute/liter

2 = gT/l is grams of tuballoy (U-238) per liter

3 = all volume in gallons

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774 (continued)

Bldg	General Types and Levels of Contamination	Year	Monthly Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
889	Decontamination water contains both uranium	1969	1,000	14 7 ppm 2 3 x 10^6 d/m/1	5,000	< 05	10 2-12 5	
	and plutonium Year total	1970	1,000	2 3 x 10^5	<5	< 05	9 9	
	Year total	1971	1,000	4 8 x 10^5	<5	< 05	5 8	
		1972	1,000	1 3 x 10^5	11,100	52	5 4-9 6	
		1973	2,500	4 9 x 10^5	117	1	7 6-12 6	
		1974	1,400	4 6 x 10^5	55	74	11 6-13 5	
		1975	1,600	3 1 x 10^5			1 7-8 5	2,400d/m/1Pu
		1976	na entries					
122	Small amount of low-level waste - it is held in an underground tank and transferred to a portable tank which is transported to either 774 or one of the ponds depending on the level							
123	Small amount of low-level lab waste but with nitrate ion concentration (raw waste to 207 ponds)							
886	Small amount of waste held in aboveground steel tank and transported by portable tank (U-235)							
776	High volume - high activity (prior to 1969	1969	149,000	13 x 10^6 d/m/1	117	< 05	7 7-10 3	
	waste was low-level and transferred	1970	164,000	39 x 10^6 d/m/1	<5	< 05	6 2-12 2	
	directly to the ponds - see raw waste	1971	68,900	86 x 10^6 d/m/1	138	< 05	2 1-9 8	
	section) Activity refers to plutonium	1972	136,300	630 x 10^6 d/m/1	35,100	< 05	6 7-10 4	
		1973	112,900	3 77 x 10^9d/m/1	<5	< 05	5 8-9 5	
		1974	40,100	17.2 x 10^6d/m/1	<5	< 05	4 0-10 3	31 6x10^6d/m/1 Pu
		1975	26,900	58 x 10^6 d/m/1	<5	< 05	5 0-10 5	
		1976	25,000	6 86 x 10^6d/m/1	<1	< 05	9 9-11 2	

NOTE

771 Waste into first stage of 774 - all this waste was transferred in lines that run through a tunnel between 771 and 774 and are thus double-contained and inspectable This waste was summarized for 1953-1966 and this summary is contained After 1966 the volume was greatly increased and time limitations prevented a summary of more recent years

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774 (continued)

Bldg	General Types and Levels of Contamination	Year	Monthly Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
771	Janitor waste and decontaminated water (prior to 1969 waste was low-level and transferred directly to the ponds - see raw waste section) Activity refers to plutonium	1969	25,600	1 9 x 10^6d/m/l	39	< 05	4 1-7 8	
		1970	46,500	8,000 d/m/l	108	< 05	5 4-8 4	
		1971	14,000	14,000 d/m/l	10	< 05	7 6-8 8	
		1972	7,700	7,700 d/m/l	100	< 05	3 5-7.4	
		1973	8,700	5,100 d/m/l	650	< 05	3 3-11 6	
		1974	5,500	210,000 d/m/l	20	< 05	7 4-10 3	
		1975	6,000	4,200 d/m/l	<5	< 05	6 8-7 9	
		1976	4,200	1,300 d/m/l	21	< 05	5 7-6 6	
707		1972	18,200					
		1973	12,000					
		1974	8,300					
		1975	8,100					
		1976	8,000					
779		1972	11,400					
		1973	9,200					
		1974	8,000					
		1975	4,300					
		1976	5,000					

TREATED WASTE FROM 774 (TANKS 66, 67, 68) TO PONDS

Description		Year	Monthly Average Gallons Volume	d/m/l Activity	NO_3 (ppm)	CR^{+6} (ppm)	F^- (ppm)	Beta
To Pond 2-A (207-A)	Year total	1956	200,000	200,000				
		1957	181,000	60,000	9,600			
		1958	233,500	32,000	22,000			
		1959	110,100	200,000	64,000			
		1960	108,000	154,800	715,000			
		1961	26,700	4,400	25,000			
		1962	no entries					
		1963	no entries					
		1964	86,200	19,000	41,200			
		1965	223,100	40,000	68,000			
		1966	280,000	23,000	110,000	< 05	1,000	
		1967	129,000	52,000	135,600			
		1968	145,500	130,000	87,900			
Year total		1969	78,850	190,000	52,000			
		1970	94,600	130,000	70,400			
		1971	196,000	37,000	59,700			
		1972	266,300	200,000	151,200			
		1973	292,000	320,000	70,400			
		1974	195,000	30,000	90,000			770,000
		1975	253,600	30,000				2.1×10^6
		1976	172,650	27,000				$4 ? \times 10^5$
To Pond 2-B (207-B)		1960	40,800	5,800	21,000			
		1961	96,340	18,000	26,000			
		1962	140,900	9,400	35,000			
		1963	142,400	7,100	45,200			
		1964	114,900	11,000	56,600			
		1965	288,400	24,000	113,000			
		1966	230,600	12,000	90,000			
		1967	144,300	55,000	98,200			
		1968	82,100	150,000	93,600			
		1969-1972	no entries					
Year total		1973	9,900	34,000	69,600			
		1974	221,000	29,000	166,400			
		1975-1976	no entries					

TREATED WASTE FROM 774 (TANKS 66, 67, 68) TO PONDS (continued)

Description	Year	Monthly Average Gallons Volume	d/m/l Activity	NO_3 (ppm)	CR^{+6} (ppm)	F^- (ppm)	Beta
To Building 95 Ponds (Pond 3)	1954	68,700	440	3,300	18 ppm U		
	1955	47,800	693	4,850		20 ppm	
	1956	54,940	900	10,000	< 05		
	1957	143,100	2,000	5,800			
	1958	104,700	1,000	6,800	< 01	125	
	1959	82,500	2,200	5,900	< 05	>100	
	1960	100,600	1,100	1,300	< 05	50	
	1961	199,000	1,000	800	< 05	50	
	1962	158,800	1,100	995	< 05	60	
	1963	218,300	2,700	620	< 05	40	
	1964	200,800	1,400	880	< 05	20	
	1965	45,900	1,700	480	< 05	40	
Total year	1966	242,400	2,100	650	< 05		
	1967	146,300	1,700	388	< 06		
	1968	no entries					
	1969	212,700	5,300	53	18		
	1970	204,500	1,600	22	< 05		
	1971	93,700	2,700	<5	< 05		
	1972	57,140	3,000	28 4	52		
To Sewage Tank 990	1973	Average 67,730	1,600	12 ppm	< 05 ppm		

RAW WASTE TO PONDS (FOR BREAKDOWN BY SOURCE - SEE COMPLETE DATA)

Description		Year	Volume	U-235	U-238	NO_3	CR^{+6}	Other (ppm)	pH	Pu
To Pond 2-A	Year Total	1956	101,580	9,200 d/m/1						
		1957	215,800	34,800		550 ppm	16 ppm	F 154,000 I 6,020	3 1-11 7	
		1958	77,600	168,600	1 31 g/1				2 0-11 8	
		1959	66,100	5 7 ppm	45 g/1		<1			
		1960	87,500	14 ppm	1 1 g/1			1 1 g/1		
		1961	48,500	15 ppm	1 72 g/1					
		1962	56,200	2 ppm	1 23 g/1					
		1963	no entries							
		1964	108,200	2 1 ppm	1,500 d/m/1 625 g/1	<5 ppm			10 4-12	
		1965	104,800	2.2	05 g/1	240	< 05	F 100	6 6-11 7	
		1966	106,000	2 9		38,000				
		1967	691,504	78 ppm		9,600				
		1968	235,900	39 ppm		195			2 7-7 5	
		1969	70,750	1 25		8,480	30 8			
		1970	94,750	5 8		10,120	110		1 2-10 9	
		1971	267,100	4 6	1,056 ppm	492	210	Be 100 ppm	1 5 x 10^6 d/m/1	
		1972	94,000	5 4	647	3,000	24 2	Be 1 15	3 5-11 7	027g/12600d/m/1
		1973	154,600	180,000 d/m/1		5,800	194			5,100 d/m/1
		1974	125,400	150,000 d/m/1	1 7 ppm	338	24			5,800 d/m/1
		1975	122,100	27,000		135	13	PO_4 29		9,600 d/m/1
		1976	103,600	26,000 41 ppm	46 ppm	<1				21,000

RAW WASTE TO PONDS (FOR BREAKDOWN BY SOURCE - SEE COMPLETE DATA) (continued)

Description	Year	Volume	U-235	U-238	NO_3	CR^{+6}	Other (ppm)	pH	Pu
To Pond 2-B	1961	40,300	7 3 ppm	1 05 g/l				9 0-11 8	
	1962	106,800	8 6 ppm	1 1 g/l	6			4 0-12 0	
	1963	55,400	4 ppm	1 52 g/l	140			5 0-11 3	
	1964	37,300	2 9 ppm	29 g/l		<1		11 0	
	1965	41,750	5 5 ppm	980,000 d/m/l 53 g/l	4,200	<1	25	3 0-11 1	
	1966	27,200			540			2 5-11 2	
	1967	110,800	10 5 ppm	50,000 d/m/l 069 g/l	7,200	< 05			
	1968	no entries							
	1969	99,900	335 ppm	82,000 d/m/l	8,000	< 05		1 4-10 1	
Year total	1970	8,100	54 ppm		1,560			2 7-3 3	
	1971	no entries							
	1972	no entries							
	1973	121,800	22,000 d/m/l	4,500 d/m/l	438	< 05	tritium 7136		12,000 d/m/l
	1974	146,400	28,000	20,000	640	< 05		1 7-12 6	6600
	1975	4,500		13,000				7 0	
	1976	no entries							

RAW WASTE TO PONDS

Description	Year	Volume Gallons	Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other (ppm)
To Building 95 Pond (Pond 3)	1957	208,200	800 d/m/l	8	01 ppm		F^- 50
	1958	482,100	1,000 d/m/l				
	1959	339,100	800 d/m/l	10	< 05	9 0	F^- 10
	1960	550,800	1,600	40		8-10.5	F^- <10
	1961	432,400	1,400	45		5 8-11.5	
	1962	459,200	1,700	68	< 05	4 5-11 4	F^- <10
	1963	667,100	2,400	10	46	6 5-11 9	F^- 25
	1964	651,200	2,200	<5	< 05	8 9-12 0	F^- 45
	1965	661,300	2,800	<5	< 05	10 4-11 7	F^- 30
	1966	580,700	2,600	97	< 05	6 1-11 9	
	1967	308,620	2,900	21	< 08	3 8-10 5	
	1968	359,000	6,400	128	1 1	3 1-10 5	
	1969	306,000	5,800	50	33	3.9-10 0	
	1970	299,000	4,500	11	< 05	6 3-9 4	
	1971	449,200	19,000	47	< 05	6 5-10 2	
	1972	496,500	25,000	16	< 05	2.8-11 4	Be .67
	1973	331,000	16,000	40	09	6.1-12 2	
Raw waste to Pond 2 (old clay-lined)	1954	7,500	753				
	1955	42,300	4,000				
	1956	18,600	1,000				
	1957	291,600	1,000	5			
	1958	46,600	42,600		01		F <10
	1959	172,800	24,000	2,400 ppm	<1 ppm	1 6-11 7	
	1960	41,400	1,300 d/m/l	162	3 9	4 5-12 5	
Treated waste to Pond 2 (old clay-lined)	1954	123,700	25,213	16,800		8 5-11 9	F 160 .59 ppm U
	1955	81,200	2,600	22,000		11 8-12 6	F^- 1000
	1956	104,100	4,000	39,700			
	1957	*no entries*					
	1958	78,000	2 700	800			
	1959	75,208	280,000	26,500			F^- >100 Cd < 05

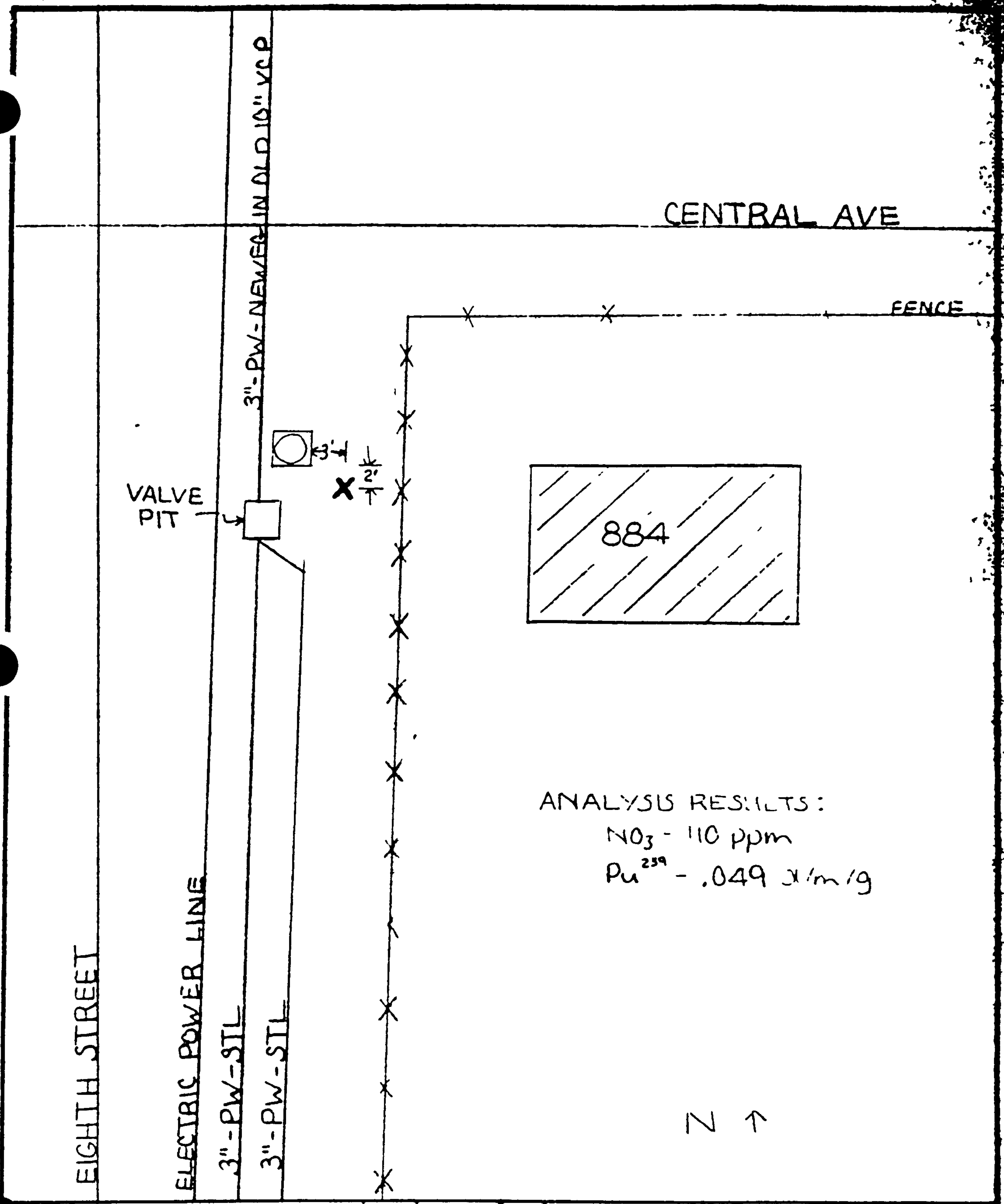
APPENDIX 3 - SOIL SAMPLES

Nine locations were chosen for soil sampling in areas where repairs or leaks have occurred. All samples were taken from the bit of an auger after drilling to about 4' deep. Soil sample pits were located as close as possible to the area of concern and generally on the northeast side. Exact distances are noted on the sketches contained in this appendix.

Soil sample analyses were conducted by the Health and Environmental Science Labs, under the direction of Weldon Williams.

Soil sample analysis results:

Sample No.	NO_3 (ppm)	Pu^{239} (d/m/g)
1	62	0.037
2	110	0.049
4	54	0.145
5	148	0.485
6	104	0.05
7	70	0.185
8	76	1 83
9	44	3.385



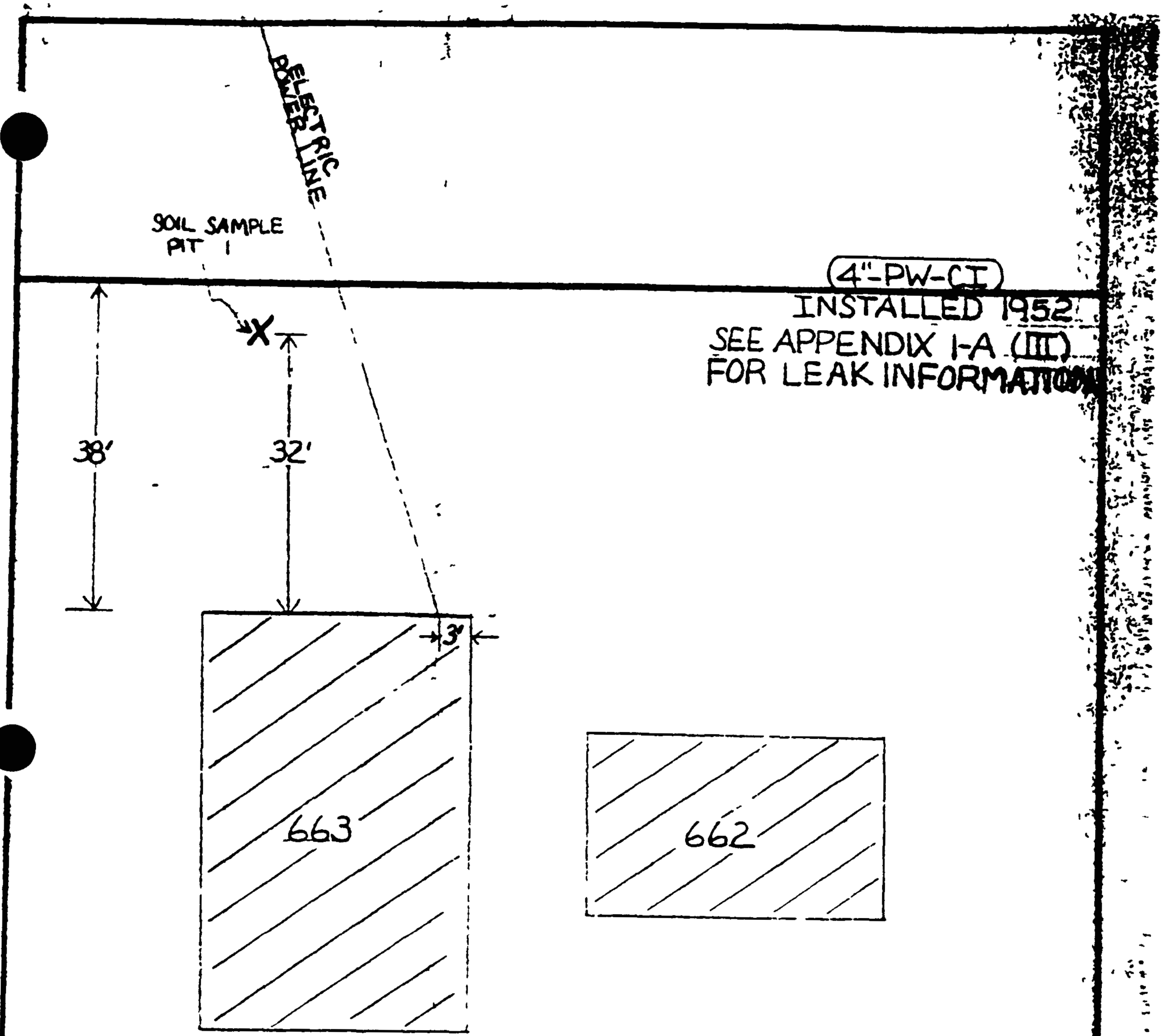
REV	DESCRIPTION	APPR'D	CL APPR'D	REV	DESCRIPTION	APPR'D	CL APPR'D

DESIGNED
DRAWN
CHECKED
APPROVED
RELEASE DATE

SOIL SAMPLE PIT 2
REF DWG
15501-37 E-5

ROCKWELL INTERNATIONAL
ATOMICS INTERNATIONAL DIVISION
E.R.D.A. CONTRACT E
ROCKY FLATS PLANT GOLDEN, COLORADO

SIZE		REV	SHEET
A	PG 3-3		OF



ANALYSIS RESULTS:

NO_3^- 62 ppm

Pu^{239} - 0.037 d/m/g

N ↑

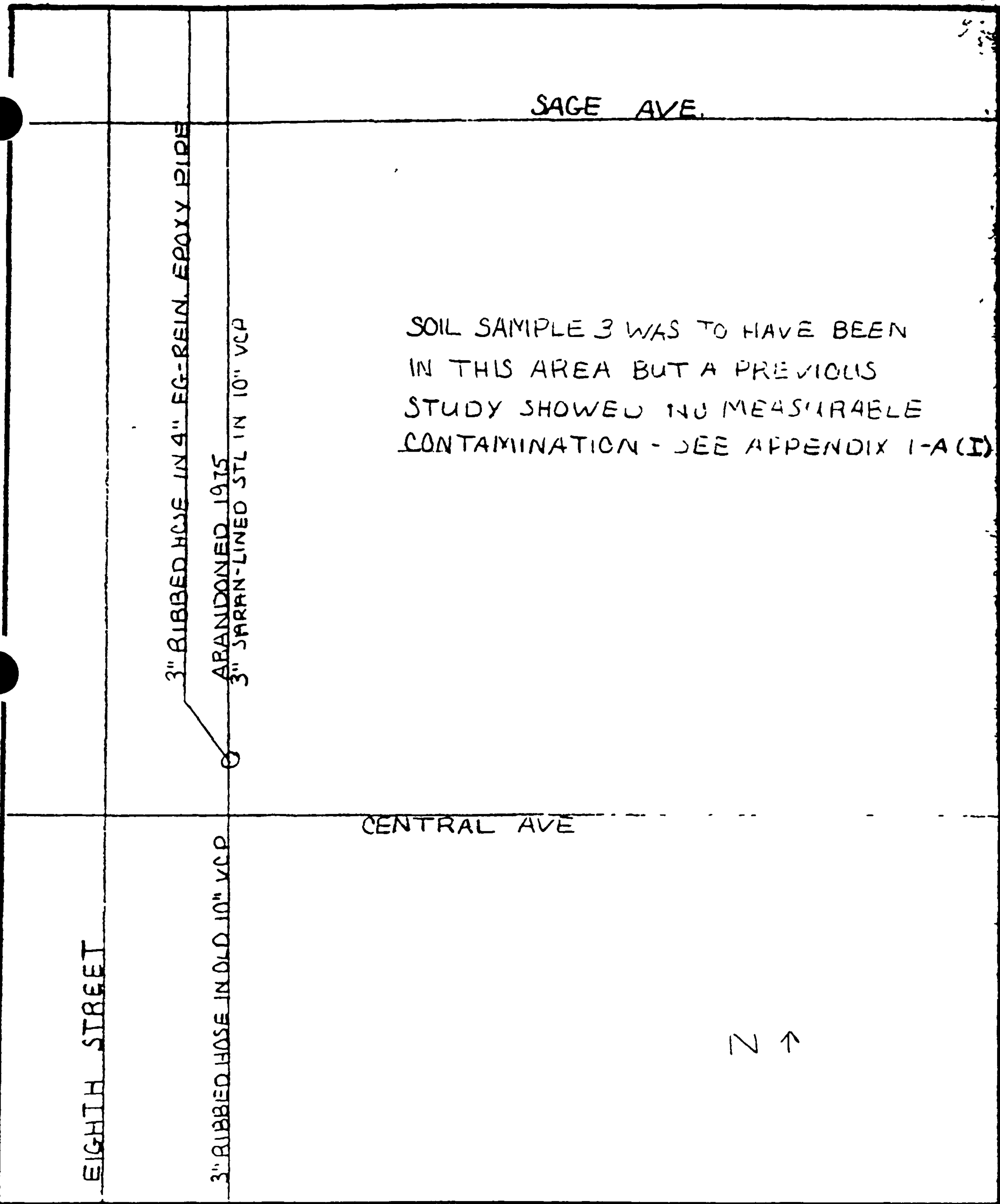
DESCRIPTION	APP'D	CL APP'D	REV	DESCRIPTION	APP'D	CL APP'D

DESIGNED
DRAWN
CHECKED
APPROVED
RELEASE DATE

SOIL SAMPLE PIT 1
REF DWG
15506-36 E-4

ROCKWELL INTERNATIONAL
ROCKY FLATS PLANT GOLDEN, COLORADO

SIZE A PG 3-2 REV SHEET OF



V	DESCRIPTION	APPR'D	CL APPR'D	REV	DESCRIPTION	APPR'D	CL APPR'D

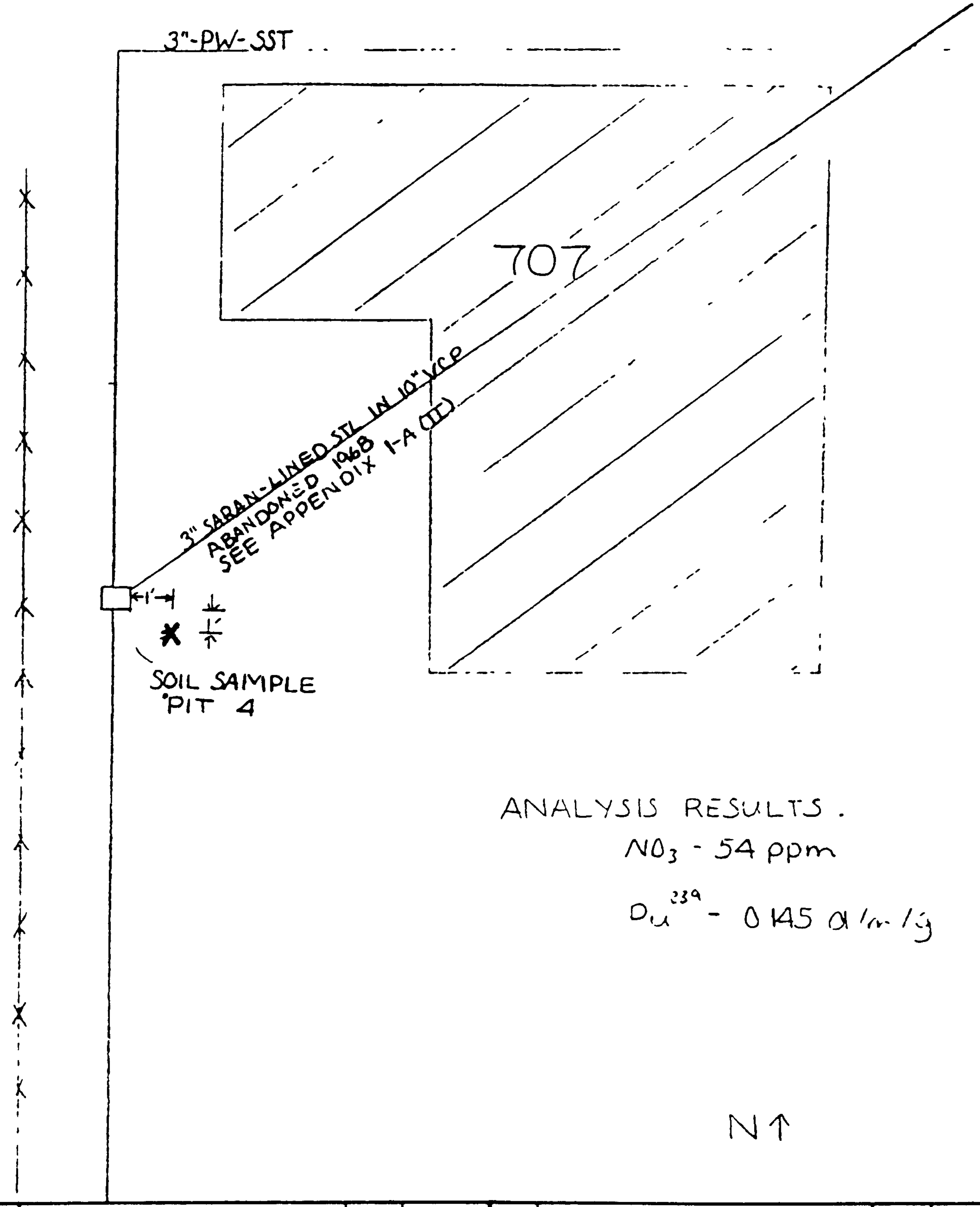
SIGNED
DRAWN
CHECKED
APPROVED
RELEASE DATE

SOIL SAMPLE PIT 3
REF DWG
15501-29 D-5

ROCKWELL INTERNATIONAL
ATOMICS INTERNATIONAL DIVISION
E.R.D.A. CONTRACT E (29-2)-3533
ROCKY FLATS PLANT GOLDEN, COLORADO 80401

BLDG.
ROOM
CAT

SIZE		REV	SHEET
A	PG 3-4		OF



ANALYSIS RESULTS.

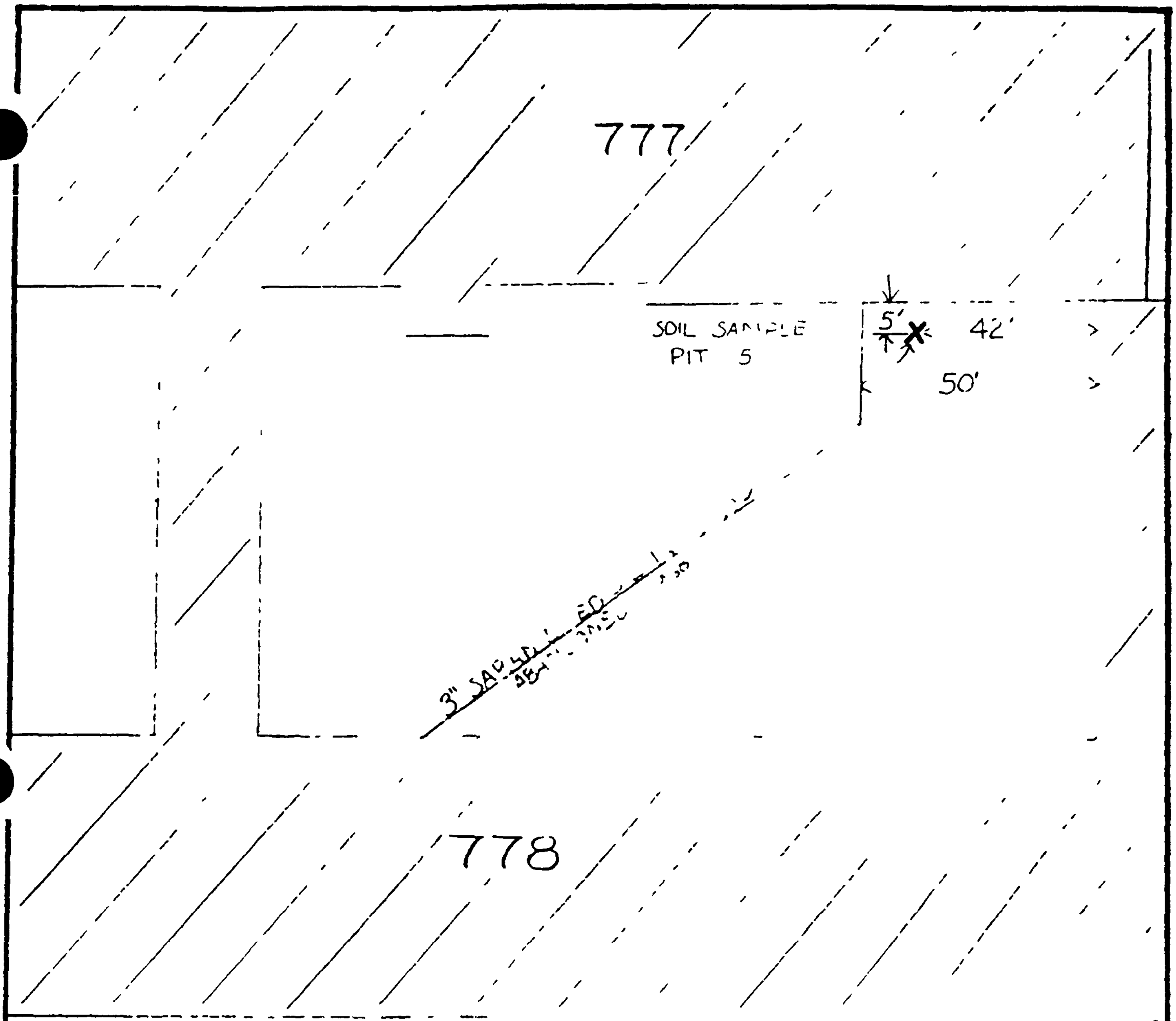
NO_3 - 54 ppm

Pu^{239} - 0.145 d/m/g

N ↑

DESCRIPTION	APP'D	CL APP'D	REV	DESCRIPTION	APP'D	CL APP'D	BLDG.

SIGNED	SOIL SAMPLE PIT 4	ROCKWELL INTERNATIONAL ATOMICS INTERNATIONAL DIVISION E.R.D.A. CONTRACT E [illegible] ROCKY FLATS PLANT GOLDEN, COLORADO [illegible]			ROOM
DRAWN	REF DWG				
CHECKED		SIZE		REV	SHEET	CAT
APPROVED	15501-29 D-5	A	PG 3-5		OF
RELEASE DATE					



ANALYSIS RESULTS.

NO_3 - 148 pp

Pu^{234} - 0.455

N ↑

REV	DESCRIPTION	APPR'D	CL APPR'D	REV	DESCRIPTION	APPR'D	CL APPR'D	BLDG

DESIGNED
DRAWN
CHECKED
APPROVED
RELEASE DATE

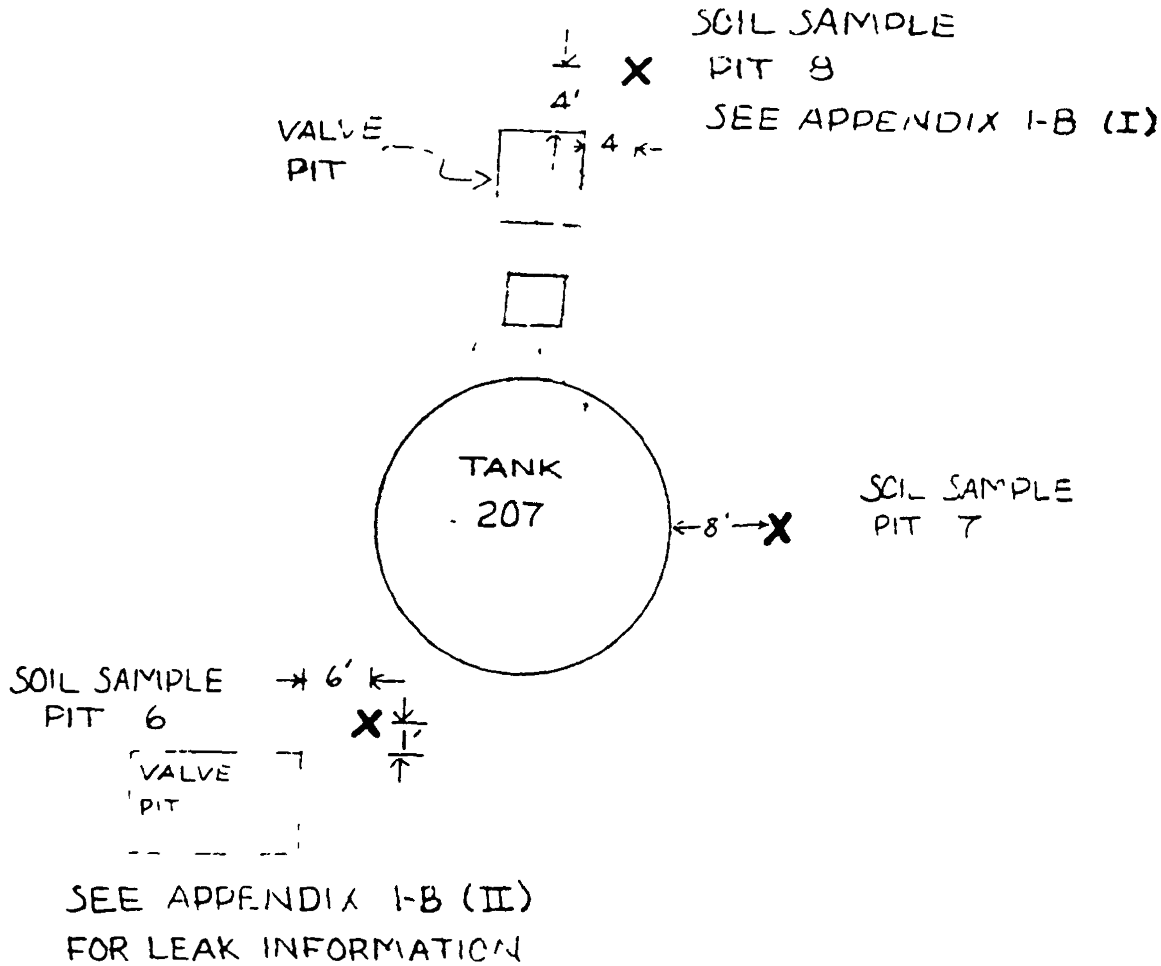
SOIL SAMPLE PIT 5
REF DWG
15501-21 G-5

ROCKWELL INTERNATIONAL
ATOMICS INTERNATIONAL DIVISION
E.R.D.A. CONTRACT E (29-2)-3533
ROCKY FLATS PLANT GOLDEN, COLORADO 80401

SIZE: A
PG 3-6
REV
SHEET OF
CAT.

ANALYSIS RESULTS:

SAMPLE NO.	NO_3 (ppm)	Pu^{239} ([illegible]/g)
6	104	0.05
7	70	0.185
8	76	1.83



REV	DESCRIPTION	APPR'D	CL APPR'D	REV	DESCRIPTION	APPR'D	CL APPR'D

DESIGNED
DRAWN
CHECKED
APPROVED
RELEASE DATE

SOIL SAMPLE PITS 6,7,8
REF DWG
15501 - 13 B-5

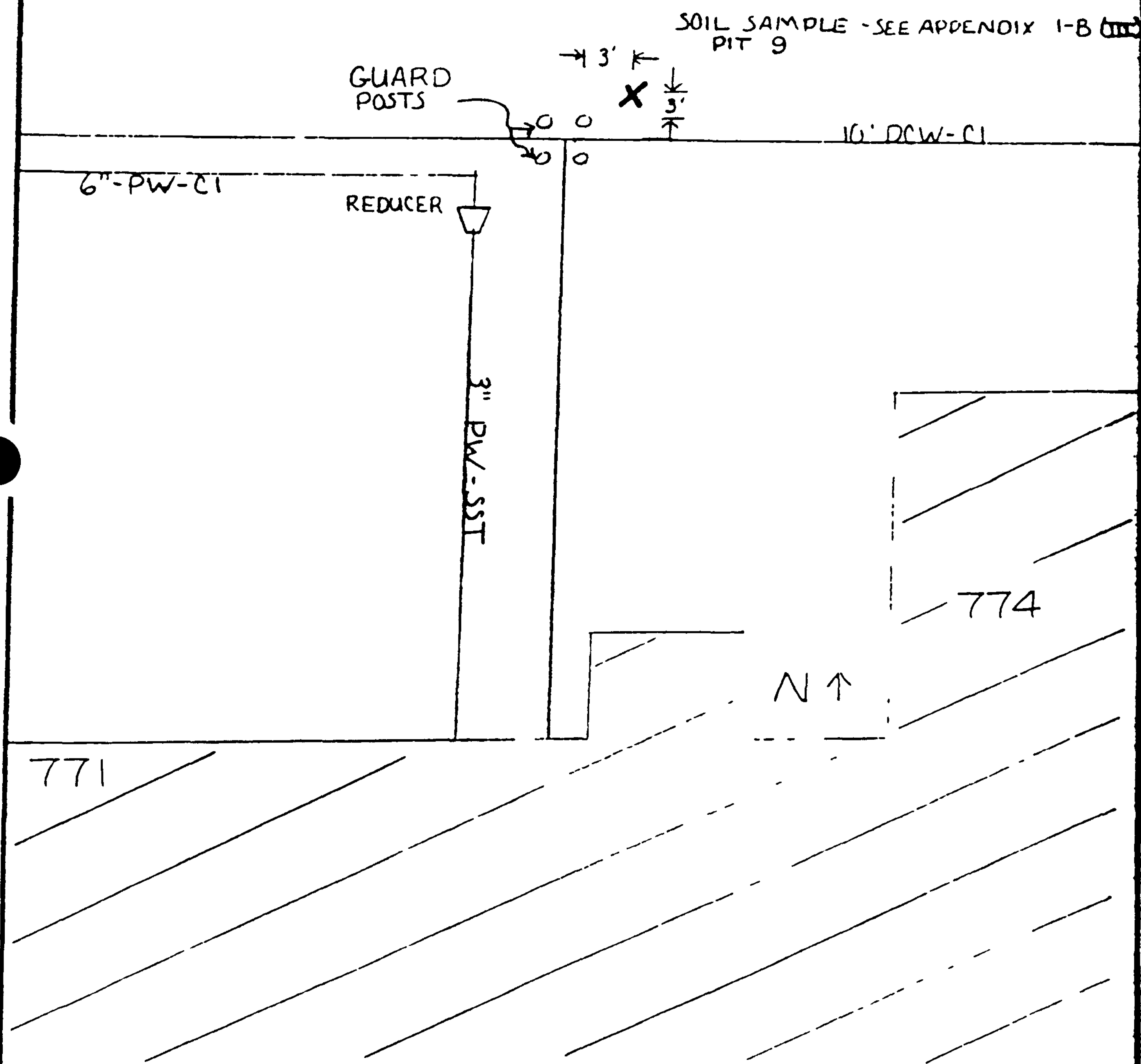
ROCKWELL INTERNATIONAL
ATOMICS INTERNATIONAL DIVISION
E.R.D.A. CONTRACT E (29-2)-3533
ROCKY FLATS PLANT GOLDEN, COLORADO 80401

SIZE A
PG 3-7
REV
SHEET OF
BLDG.
ROOM
CAT

ANALYSIS RESULTS.

NO_3 - 44 ppm

Pu^{239} - 3.385 d/m/g



V	DESCRIPTION	APP'D	CL APP'D	REV	DESCRIPTION	APP'D	CL APP'D

SIGNED	SOIL SAMPLE PIT 9 REF DWG 15501-13 B-5	ROCKWELL INTERNATIONAL ATOMICS INTERNATIONAL DIVISION E.R.D.A. CONTRACT ROCKY FLATS PLANT GOLDEN, COLORADO	BLDG.
DRAWN			ROOM
CHECKED		SIZE: A — PG 3-8 — REV — SHEET — OF	CAT
APPROVED			
RELEASE DATE			

APPENDIX 5 - LIBRARY SEARCH
PIPE CLEANING METHODS

A survey of the technical periodical indexes was conducted to search out new developments in the areas of pipe cleaning, plugging, and removal Cross references were used in the area of nuclear wastes as well as general pipe listings.

Although there are now a number of installations in this country which handle nuclear materials, not many have been in service as long as the Rocky Flats Plant. Understandably, there has been little written on the problem of abandoning pipelines which have the potential of containing nuclear residue. Some information was found which could be helpful in cleaning the lines but nothing on pipe plugging or removal.

One very specific procedure was recommended by Dr. J A Ayres of Battelle Northwest (1)

1. Use a solution of 18% potassium hydroxide and 3% potassium permanganate for three hours at 105° C (221° F)
2. Rinse throughly
3. Use 10% sulfamic acid for three hours at 70° C (158° F)
4 Rinse throughly

5-8 Repeat steps 1-4

Dr. Ayres has used this method to clean pipes that have carried nuclear materials Although the temperatures seem unrealistic for cleaning pipes several hundred

---

(1) How to Employ Chemical Cleaning for Power and Process Piping, C M Loucks, Heating, Piping and Air conditioning, June 1965

feet long, the solutions could still be an improvement over those used for cleaning pipes with more typical waste products.

There is ample information suggesting that sulfamic acid is better than hydrochloric. Specifically (2)

A. Inhibited sulfamic acid vs. hydrochloric acid
   1. sulfamic is safer to use, a more effective descaler and poses no corrosion problems
   2. the solution strength and temperature are not critical, even if an error is made, there is no danger of damage to equipment

B. Basic rules for using sulfamic acid
   1. keep it hot - the best temperature is about 160° F
   2. keep it strong - 40 lb dry acid descaler/50 gallons of water. Too much acid is uneconomical, too much water is not strong enough
   3. keep it moving - to keep fresh, strong acid against the pipe walls

Other periodicals which might be helpful are

<u>Applying Chemical Cleaning Solvents</u>, C. M Loucks, Heating-Piping, September 1964.

<u>Steps for Chemical Cleaning of Piping Systems</u>, C. M Loucks, Heating-Piping, May 1964

<u>How to Choose An Acidic Cleaner</u>, J. D. Palmer, Can Chem. Process., January 1970

---

(2) <u>It's Cheaper to Clean it In-Place</u>, C T Gallinger, Mill & Factory, May 1965

BIBLIOGRAPHY

<u>A Survey of the Rocky Flats Division Waste Streams</u>, C. E. Plock, CRDL 950351-009, June 30, 1972

Building 774 Log Books, kept by M. E. Maas, 1952-1976

Correspondence; letter to J. A. Watt from B. L. Kelchner; Re Engineering Study for Abandoned Process Wastes Lines, September 22, 1975

Correspondence; letter to H. E. Bowman from B. L. Kelchner, Re Inspectable and Repairable Process Systems

<u>Evaluation of Two Sections of the Rocky Flats Process Waste Line</u>, Hornbacher and Lott, PRD 950463-107, May 1972

<u>Liquid Wastes and the Nitrate Problem at the Rocky Flats Plant</u>, B. L. Kelchner, oral presentation given at the Problems Analysis Meeting held at Rocky Flats on May 25-26, 1971

<u>Pressure Testing and Leak Location Survey of Process Waste Lines at the Rocky Flats Facility</u>

REFERENCE DRAWINGS

The following drawings for location and dating of the process waste collection system are available in the Facilities Engineering and Construction Department.

Original Process Waste Lines*

15501-(Utility Drawings)

13902

25609-X08

SK-410204-(1-5)

New Process Waste Lines

25052-047

Process Waste Collection Tanks

19878-1

19878-2

* The drawings contained in this study of the process waste lines have been throughly checked and altered for accuracy. Most of the changes incorporated in the drawings are from information obtained from M E. Maas of Waste Treatment. The numerous sketches of changes and repairs in the lines kept by Mr. Maas and his excellent memory were a most important resource in locating lines. Field checks were made whenever possible such as at entry points to buildings, valve pits, etc.

10/24/80

REPORT OF INVESTIGATION ON A RECENT PROCESS WASTE PIPELINE LEAK

ES-376-80-217

C T Illsley
Environmental Analysis

ENVIRONMENTAL SCIENCES

ROCKWELL INTERNATIONAL
Rocky Flats Plant
Energy Systems Group
P. O. Box 464
Golden, Colorado 80401

60-2302-22-002

Work Performed Under Department of Energy
Contract DE-AC04-76DP03533

Distribution

T R Crites
D D Hornbacher
M E Maas
E A Putzier
E Vejvoda
C E Wickland
R E Yoder

KWIC Index

Contamination
Leak/Spill
Process Waste Water
~~Soil Cleanup~~
Illsley, C T
ES-376-80-217

INTRODUCTION

This report summarizes an environmental incident investigation of a radioactive liquid process wasteline leak that occurred on July 21, 1980 It includes a description of the incident, subsequent cleanup activities and costs, and future plans for the process waste line

INCIDENT SUMMARY

During the morning of July 21, 1980 two painters were walking along the road southeast of Building 774 They observed water seeping up in the soil on the south side of the road They immediately returned to Building 774 and informed Waste Processing personnel of the possible leak The 3 inch line carrying process waste from Building 774 to the solar evaporation ponds was immediately shut off. The leak was then observed to have stopped

Figure 1 shows the location of the leak From this point, the leaking process waste water flowed down slope through a 30 foot culvert, along the east chain link fence and under the fence at the corner From there, the liquid flowed under the unpaved access road into a boggy area north of Building 774 These areas are shown in Figures 2 and 3

Based on the pumping time and flow rate, the volume of process waste liquid that leaked onto the hillside was estimated to be about 1000 gallons Samples of the liquid were collected by personnel from the Environmental Analysis Group and subsequent analysis showed the presence of about 2500 pCi/l total alpha, 4000 pCi/l gross beta, 10,000 mg/l nitrate and a pH of 12

As soon as the soil dried out, FIDLER measurements verified the presence of alpha contamination The FIDLER survey also verified the direction of flow and that the flow did not go beyond the boggy area into North Walnut Creek If the leaking liquid had reached North Walnut Creek, it would have been contained in Pond A-3 or Pond A-1 as the A-1 bypass system was activated to divert flow into Pond A-1 soon after the leak was discovered

NOTICE:

"BEST AVAILABLE COPY"

PORTIONS OF THE FOLLOWING DOCUMENT ARE ILLEGIBLE

The Administrative Record Staff

Figure 1
Location of Waste Line Break (Foreground)

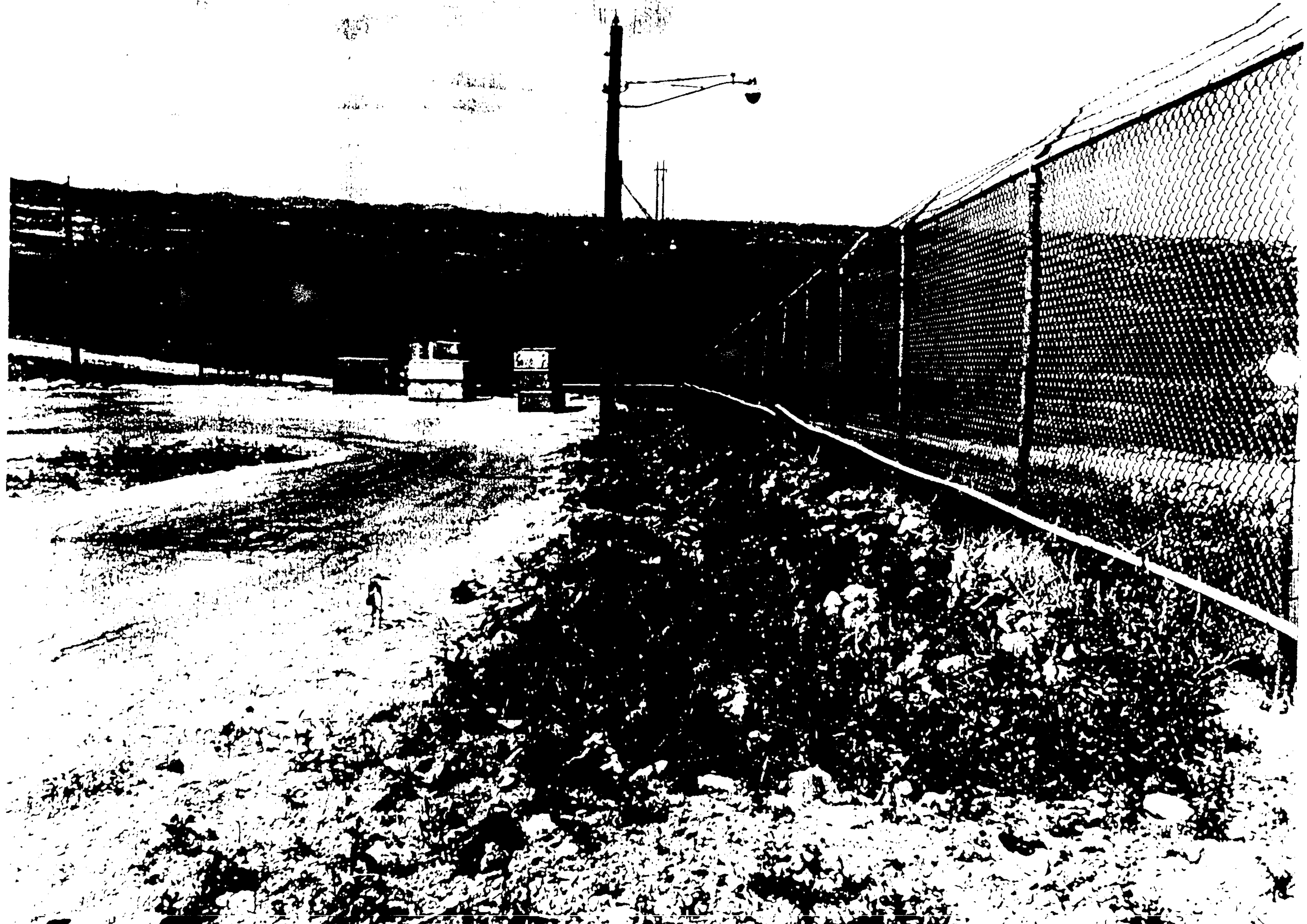
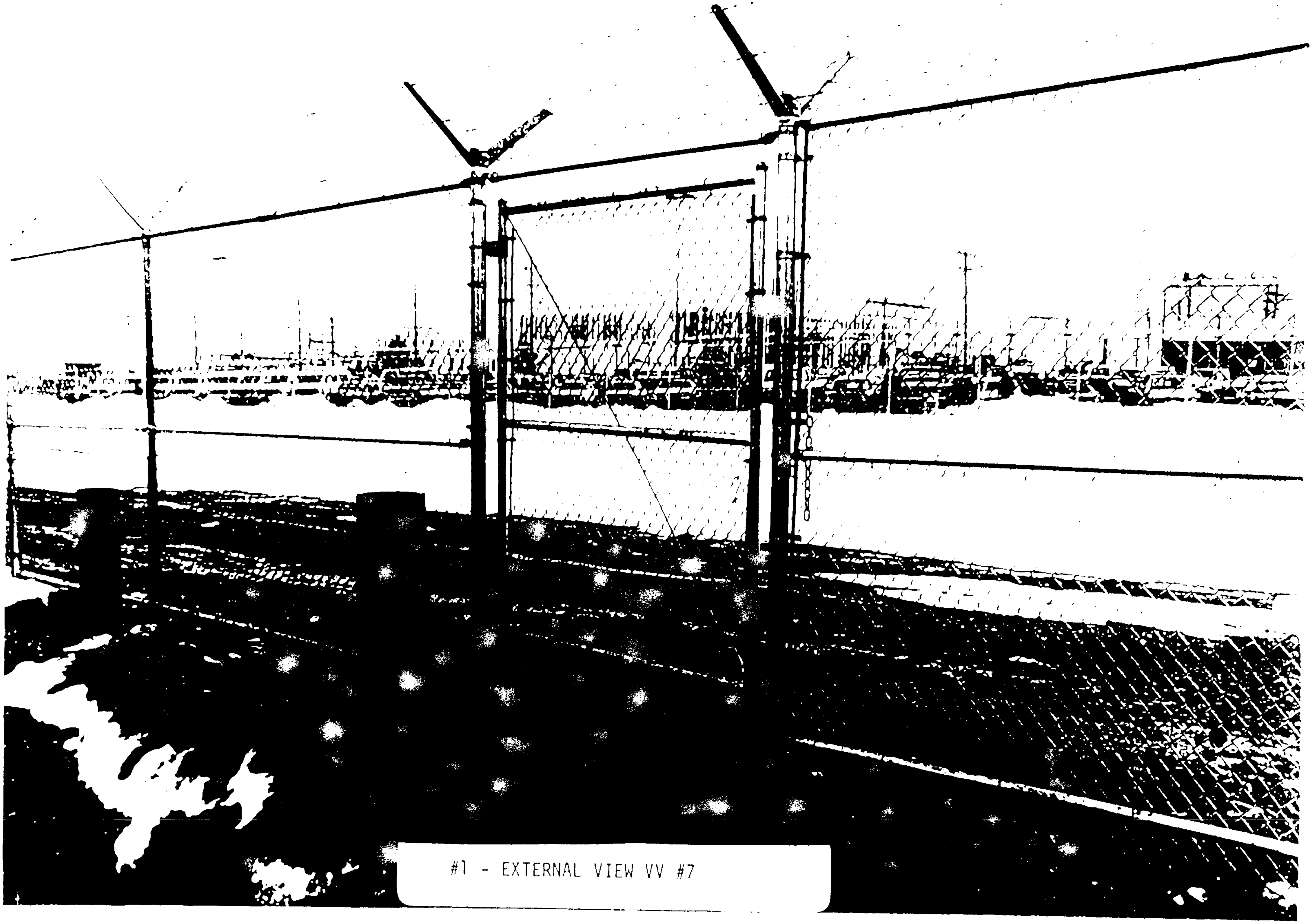
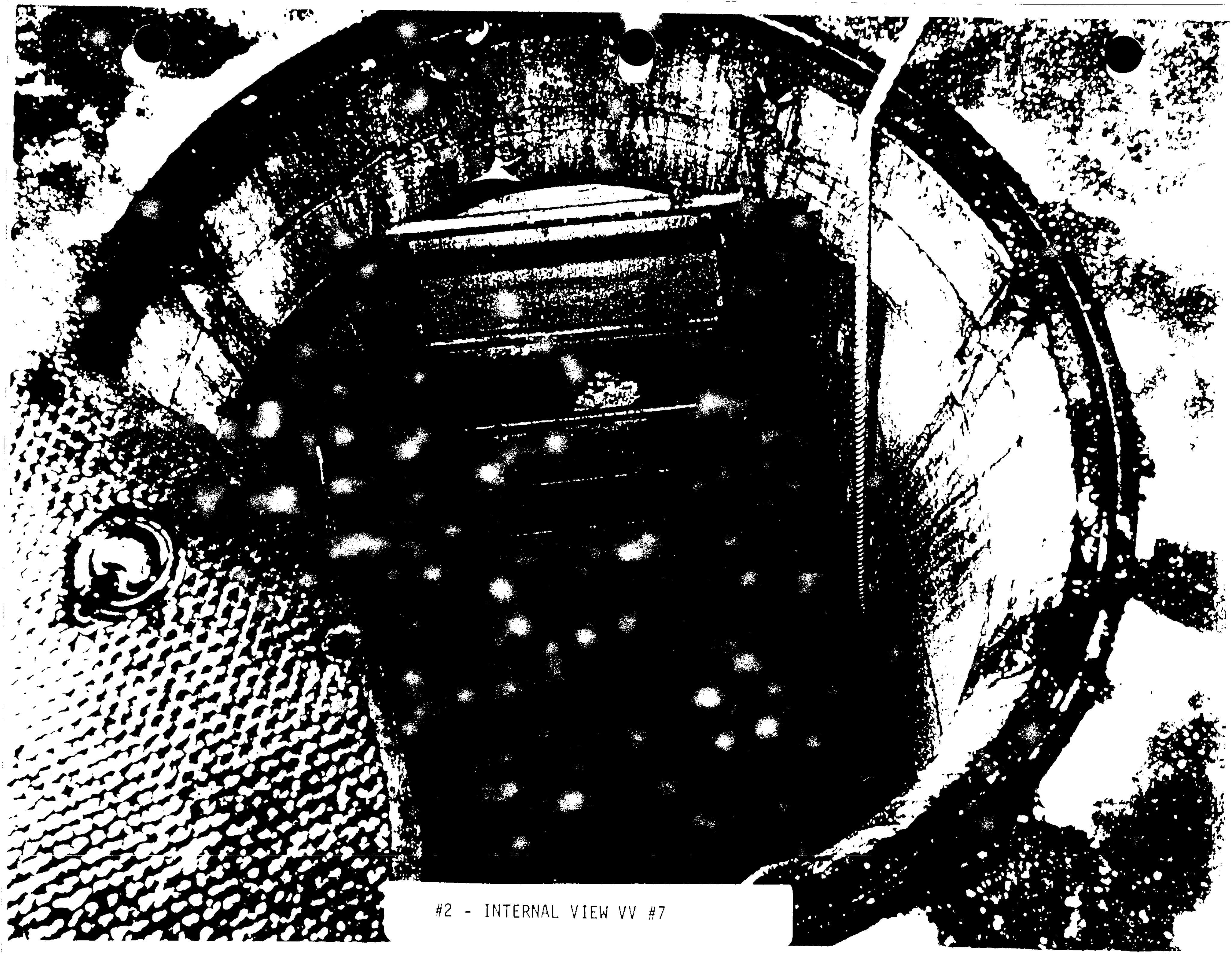


Figure 2. Flowline of Leak Along Fence

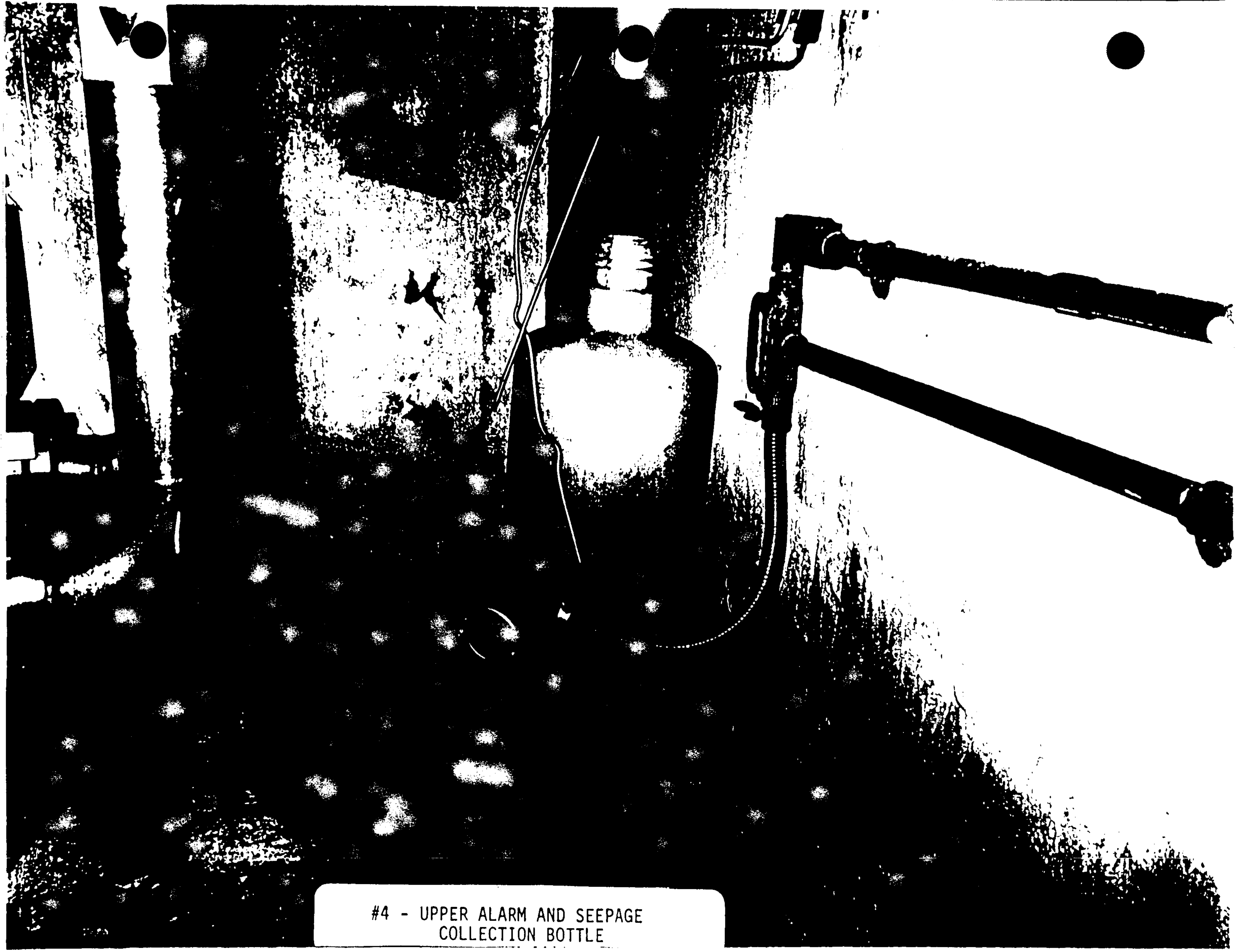
Figure 3. Vegetation Killed by Waste Process Liquids


#1 - EXTERNAL VIEW VV #7

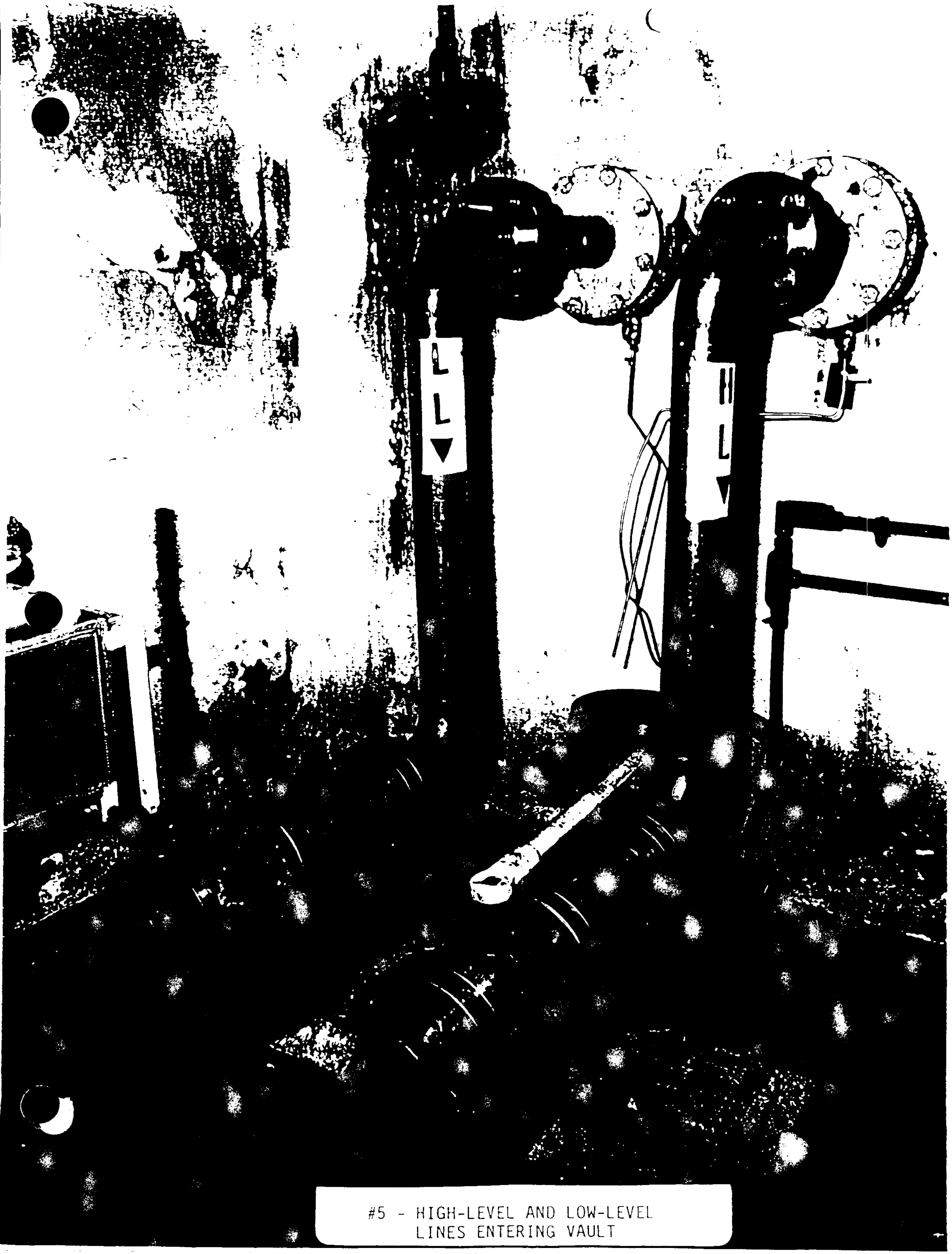


#2 - INTERNAL VIEW VV #7

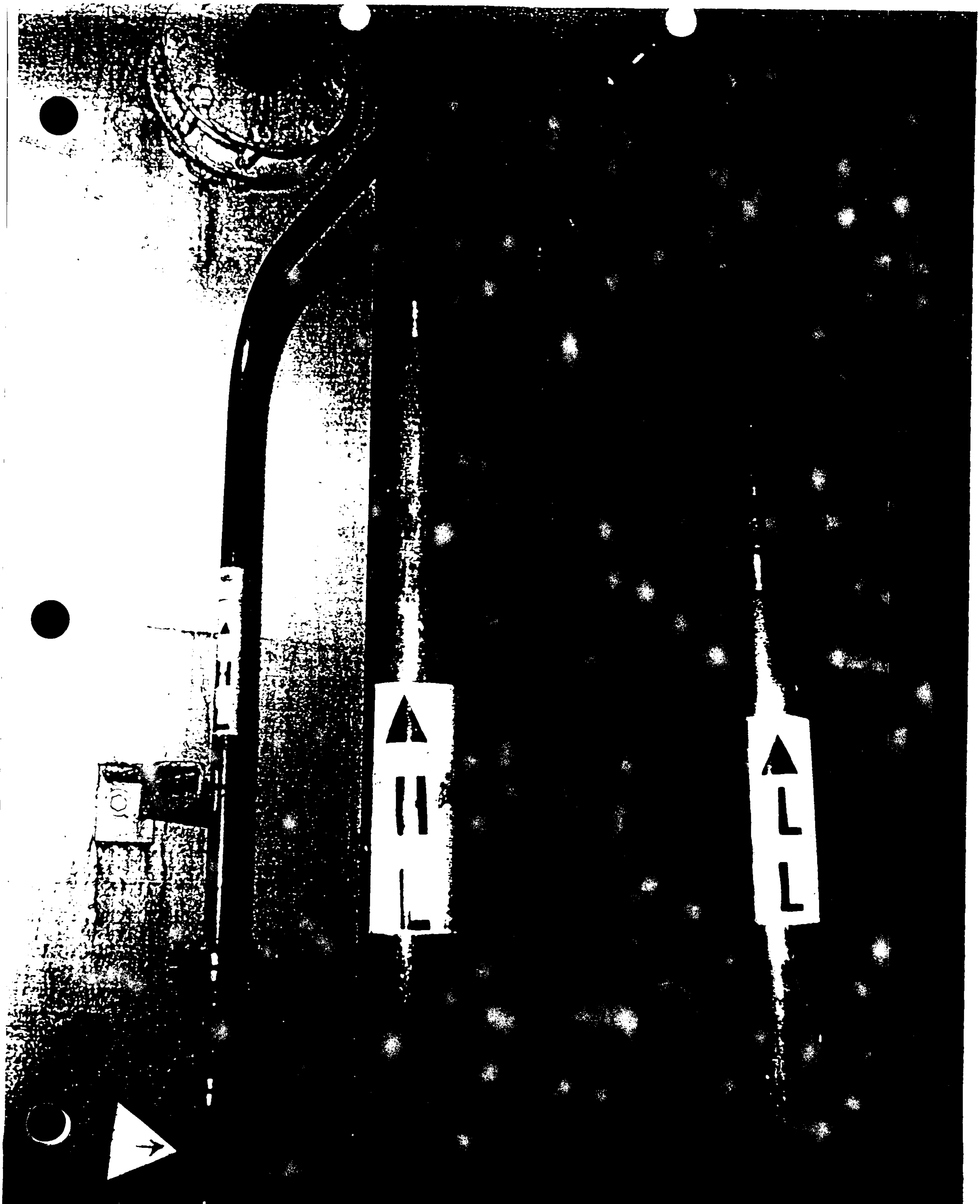
#3 - MAIN ELECTRICAL BOX



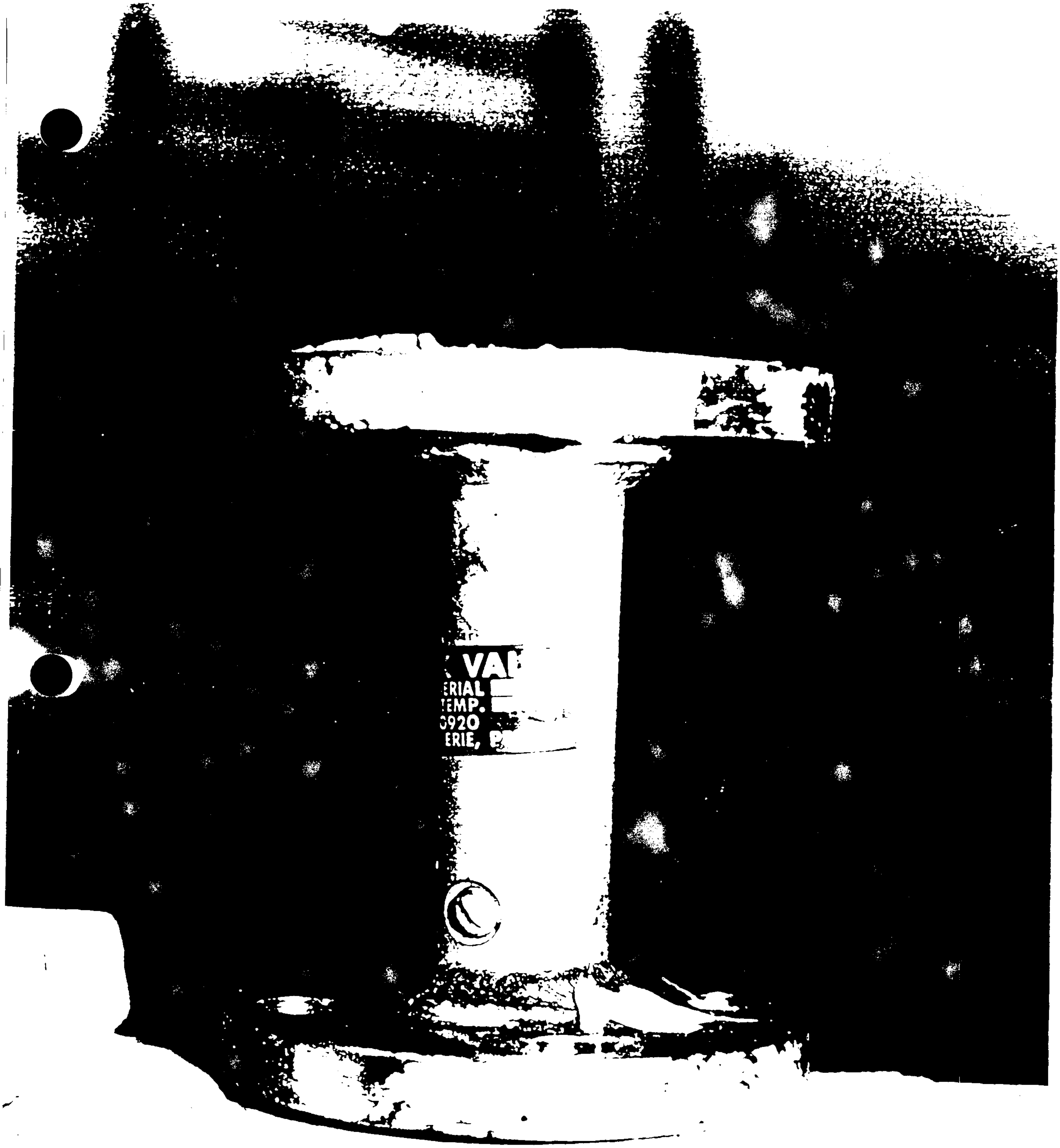
#4 - UPPER ALARM AND SEEPAGE COLLECTION BOTTLE



#5 - HIGH-LEVEL AND LOW-LEVEL
LINES ENTERING VAULT

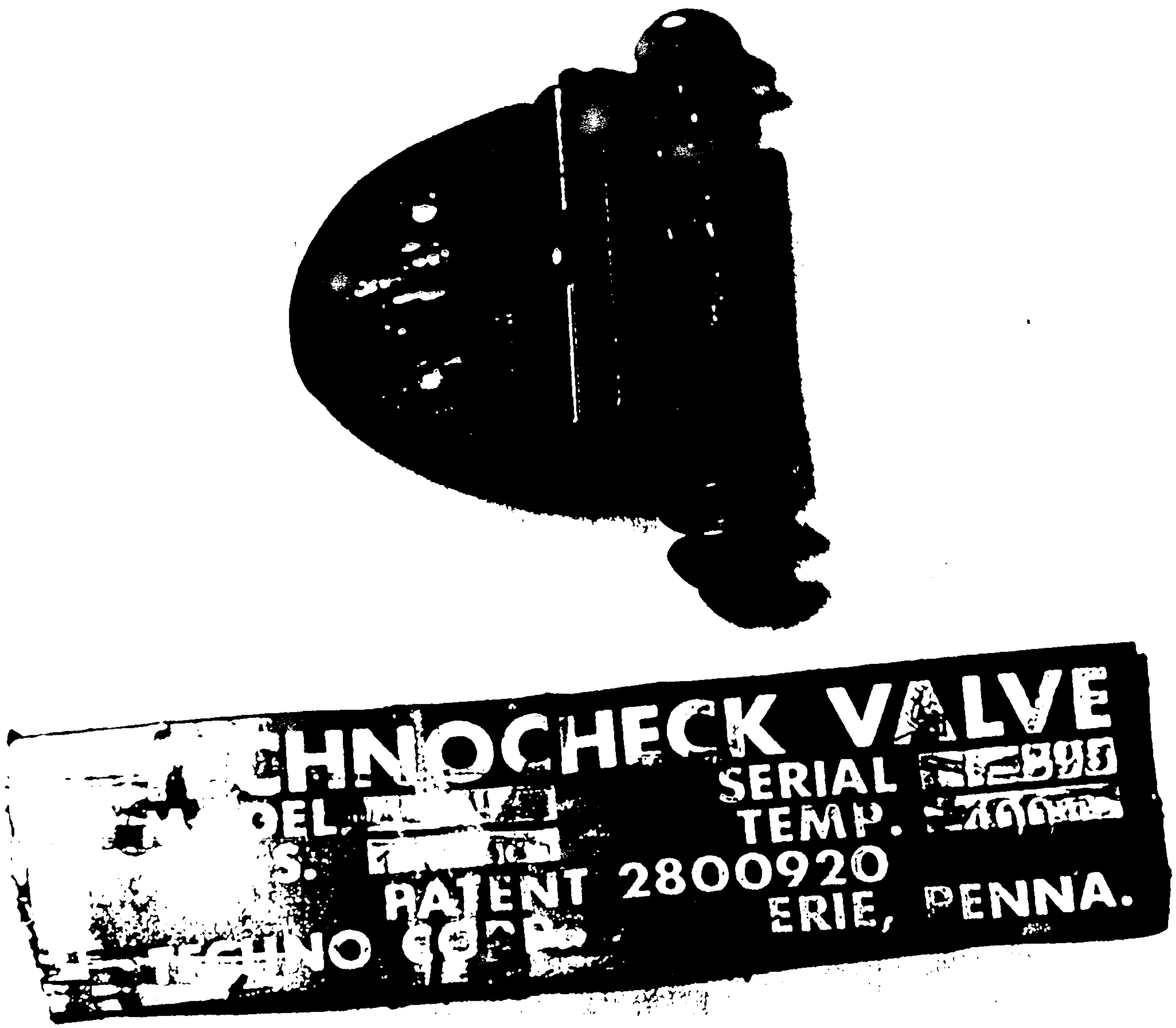


#7 - UPPER VIEW OF SUMP PUMP LINE



#4 - EXTERNAL VIEW
CHECK VALVE HOUSING

#9 - INTERNAL VIEW
CHECK VALVE HOUSING



#10 - CHECK VALVE

CLEANUP ACTIVITIES

On July 24, 1980 the broken line was excavated and the source of the leak was found to be a loose flange A new gasket was installed, the flange nuts were tightened and the line passed a leak test

A soil decontamination planning meeting also was held on July 24, 1980. Those in attendance were C J Barker and R W Hawes, Environmental Analysis, W F Bates, Waste Management, E. Klanecky, Operational Safety, and G. Webber, Radiation Monitoring

Soil excavation with a tractor mounted backhoe began on the morning of July 28, 1980 Radiation monitors checked the soil as it was excavated Portable air samples were used to check the air activity in the vicinity of the excavation and at the receiving container (box) as it was being filled. The air concentrations of total long-lived alpha activity were <0 001 pCi/m^3 in the general area and 0.108 pCi/m^3 near the box The total long-lived alpha concentration in the general area was below the shutdown action level of <0.06 pCi/m^3

CLEANUP COSTS

The estimated costs of the spill cleanup, as provided by Waste Management, are as follows

Boxes		$3,600
Transportation		2,644
Labor		7,600
	Total	$13,844

ENVIRONMENTAL IMPACT

A review of the data from permanent ambient air samplers that are located in the general vicinity of the spill was conducted The total long-lived alpha concentrations measured from samples collected during the spill and subsequent cleanup period all were normal

OUTGOING LTR. NO

80-RF-2046

DIST	LTR	ENCL
WILLIAMS, R.O.		
DORR, J.E.	X	
BENJAMIN, A.		
[illegible]SLAND W.D		
[illegible]AR D.H		
[illegible]AFR W.V		
KUNZ, E.C		
OWEN F.G		
REBRO W.L.		
SHANNON W.M.		
SMITH, R.E.		
SWEENEY P.F		
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GREER, J.A.		
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HILBIG R.A.		
HOFFMAN, R.B.		
HOPPE, R.		
[illegible]ANDETTI R.		
[illegible]ON, R.T		
[illegible]ON, R.H.		
[illegible] J.M		
KIRCHNER, B.		
KRIEG, D.M.		
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MARTINEZ, J.L.		
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O'BRIEN, M.		
PALIANI, M.A.		
PUTZIER, E.A.		
RHOADES, R.E.		
ROOKER, W.L.		
ROSS, C.		
STEWARD, L.M.		
STUMP W.D.		
THOMAS, S.G.		
TROELTZSCH, R.		
VELASQUEZ, R.N.		
WAGNER, J.D		
WEIDNER, C.		
WERNER, M.R.		
WILLIAMS, R.A.		
Hornbacher	X	
Illsley, C.	X	

CLASSIFICATION	LTR	ENCL
UNCLASSIFIED	X	X
CONFIDENTIAL		
SECRET		

AUTH. CLASSIFIER SIG

[signature]

DATE 11-12-80

L APPROVALS

[signature]

ORIG & TYPIST INITIALS

TRC/DDH/mmk

IN REPLY TO LTR. NO

RF-46469

Ent

ROCKY FL[illegible] PLANT
ENERGY SYSTEMS GROUP
P O Box 464
Golden Colorado 80401
(303) 497 7000
Contractor to
U S Department of Energy

Rockwell International

November 12, 1980

80-RF-2046

Mr. E W. Bean
DOE, RFAO

REPORT OF INVESTIGATION ON
PROCESS WASTE LINE LEAK

Enclosed are two copies of a report that summarizes an environmental incident investigation of the process waste line leak that occurred on July 21, 1980

Please direct any question that you may have to C T. Illsley at extension 7079.

[signature]

T. R. Crites, Manager
Environmental Sciences

TRC:DDH.mmk
Orig. and 1 cc - Mr Bean
Enc.

22023-RR-1

Keywords
Illsley, C T
ES-376-80-217
Contamination
Leak
Proc. waste water

Rocky Flats Plant
Energy Systems Group
Rockwell International Corporation
P O Box 464
Golden Colorado 80402-0464

(303) 497-7000

Contractor to U S Department of Energy

Rockwell International

May 5, 1983 83-RF-1036

James R. Nicks
Area Manager
DOE, RFAO

UNUSUAL OCCURRENCE REPORT - VALVE VAULT #7

Attached is the UOR Number RFP 83-2--Sage 83-1. This interim report was prepared in accordance with DOE Order 5484, Unusual Occurrence Reporting.

Robert E. Yoder

Robert E. Yoder, Director
Health, Safety and Environment

Orig. and 1 cc - J. R. Nicks
Enc.

Keyword.
UOR
Yoder RE
Valve vault
Process waste

60-20100-KK-002

UNUSUAL OCCURRENCE REPORT

ROCKWELL INTERNATIONAL

ROCKY FLATS PLANT

VALVE VAULT =7 OVERFLOW - APRIL 4, 1983

1 UOR Number RFP 83-2--Sage 83-1

2. Status and Date Initial 5-5-83

Interim 5-5-83

Final

3 Division or Project

Rocky Flats Plant, Energy Systems Group

4 Facility, System or Equipment

Process waste collection transfer system, Valve Vault #7, transporting aqueous process waste from Buildings 881, 889 and 865 to Building 374 (see Figure 1, diagram of system).

5. Date of Occurrence

April 4, 1983

6 Time of Occurrence

Overflow from Valve Vault #7 was first observed at approximately 0950. A chronological sequence of events is provided in Attachment 1.

7 Subject of Occurrence

Process waste water overflowing around manhole cover at Valve Vault #7

8. Apparent Cause

Wastes were being inadvertently pumped into Valve Vault #7 through either a break in the transfer line or a malfunctioning check valve in the sump pump line

Alarm system indicating problem in Valve Vault #7 assumed to be inoperative

"REVIEWED FOR CLASSIFICATION

By [signature]

Date 5/5/83"

9. Description of Occurrence

A check valve located in Valve Vault #7 (see Figure 2) malfunctioned allowing process waste water, being pumped out of upstream holding tanks, to backflow through the check valve and sump pump line into the vault. The vault filled with waste water and overflowed The overflow drained into an adjacent ditch and traveled in an easterly direction toward South Walnut Creek and the "B Series" ponds (see Figure 3) Photographs of the vault and faulty check valve are contained in Attachment 2

10. Operating Conditions of Facility at the Time of Occurrence

Operating conditions of the facility at the time of the occurrence were abnormal. The alarm (designed to indicate the presence of water in the vault) had malfunctioned on March 10, 1983. An inspection of the vault revealed the presence of moisture, but no accumulation of water. From past experience, it was surmised that ground water moisture had caused an electrical short. A work order was submitted to repair the system on March 11, 1983 (Attachment 3) Normal waste transfer through Valve Vault #7 was allowed to continue to avoid shut down of operations in buildings upstream from the vault.

11 Immediate Evaluation

The sequence of events provided in Attachment 1 indicate that several factors contributed to the overflow occurrence. The contributory factors are sited below

On March 10, 1983, the alarm system in Valve Vault 7 malfunctioned

On March 11, 1983, a work order was submitted to repair the alarm. The repair had not been initiated at the time of the occurrence

On March 28, 1983, alarms in Valve Vaults #1, 3, 4, 5 and 6 activated They were inspected, and no evidence of water buildup was found Valve Vault (VV) #7 was not inspected for two reasons

1) Access to the vault cannot be accomplished until Security opens the gate No one from Security was available to open the gate when two requests for access were made No further attempts were made to gain access to VV #7 for a visual inspection In retrospect, operating personnel surmise that the check valve had actually failed before March 28, and VV #7 was partially filled with water before the overflow was observed on April 4

2) The previous inspection indicated a faulty alarm rather than water in the vault False alarms occur and are a continuing problem because of intrusion of ground water through leaky conduits.

- On April 4, transfer of waste water through the system was initiated The water entered the vault through the broken check valve, filled the vault and overflowed to the adjacent environment.

The occurrence caused a temporary suspension of aqueous waste transfer through VV #7 However, the cause of the occurrence was established and remedied before operations in the upstream facilities (Buildings 881, 889 and 865) were affected. Transfer through the system was permitted before electrical repairs were completed, provided an operator remained at the pit to provide visual inspection for leaks during the transfer. Environmental samples have been taken for analysis. Evaluation of the results is complete.

12 Immediate Action Taken and Results

The following actions were taken

The transfer of liquid waste from holding tanks at Building 881 was discontinued after personnel verified that waste water was flowing out of VV #7

Temporary dikes were constructed to contain the overflow Drainage from the area was diverted from Pond B-4 to B-1, and samples were taken for analysis from the vault and from areas of environmental concern

- Water was pumped out of VV #7 and out of the containment dikes into a tanker truck for transfer to Waste Processing

- After emptying, the vault was cleaned and inspected.

- Inspection identified a faulty check valve as the primary cause of the occurrence

  The check valve was repaired, and the system was leak-checked by pumping waste through the system. No leaks occurred.

- The sump pump was replaced, and repair of the electrical system was initiated. Repairs were completed on April 12, 1983.

  Arrangements were made to transfer waste through the system using an operator stationed at the pit to check for leaks Constant visual check during transfer was required until the electrical repairs were completed and the system fully operational.

- A new type of check valve has been ordered for all the valve vaults in the transfer system When the new check valves arrive, all check valves in this transfer system will be replaced

13 Is Further Evaluation Required? Yes [X] No [ ] See #15

The primary cause of the occurrence was corrected by replacing the check valve and making electrical repairs Future problems may be alleviated by installing a better quality check valve However, the secondary causes of this occurrence will still exist. Specifically, the unresolved problems are

- False alarms occur regularly due to humidity from ground water intrusion through leaky conduits. Human nature tends to ignore alarms that often "cry wolf" when no wolf is there

  Repair of a faulty alarm should be given high priority. The work order specified that the "date needed" was the same date that the order was submitted Three weeks later, the work had still not been initiated The system does not appear to be functioning as intended

- The location of VV #7, beneath the security fence, requires coordination with Security to gain access to the vault. The individual with the key may not be available when entry is needed.

These problems should be addressed by management to avoid a similar occurrence in the future (E. R Young, W D. Crossland, E. Vejvoda 7-5-83)

14. Final Evaluation and Lessons Learned

This section will be completed in the final report.

regarding the nature of the vault and whom to notify in the event of an emergency had been posted at the vault, the response time would have been reduced. It is recommended that the following information be posted at each vault (E. Vejvoda)

Valve vault number and type
(i e., VV #7, Process Waste Line)

Responsible Organization

Emergency telephone number

Additional recommendations not directly associated with the occurrence (R. E. Yoder)

The presence of oil in the overflow was visually detected. Disposal of oil to the process drain is prohibited since it interferes with the waste treatment process. Generators should be reminded that compliance with HS&E 21 01, sections 3.3 and 4 are mandatory.

New construction on the plant site has occurred The current map of the storm sewer system should be reviewed and updated as deemed necessary.

Environmental Impact Evaluation - The environmental impact was negligible In addition to the immediate actions cited in Section 12, Environmental Control retained snow melt water in the ditch for several days and later transferred this water to process waste storage. Gravel from the ditch was excavated and removed to a special storage area for drying. This material will be analyzed for nitrates, oil and radioactivity before final disposition

Final analyses of water samples from Pond B-1 and Pond B-4 one week after the indicent indicated no abnormal concentration of oil, nitrate, pH or radioactivity

Evaluation of Data for Pond B-5 - The only pond that will be discharged to off site waters indicated the absence of any material from the leak Furthermore, the water meets the DOE and CDH Radiation Guides for discharge to uncontrolled areas

16 Programmatic Impact

None

17. Impact Codes and Standards

None

18 Similar Unusual Occurrence Report Numbers

None

19 Signatures

Date 4/25/83
John A. Hayden, Chairman Investigating Committee

Date 4-25-83
Donald M. Anderson, Investigating Committee

Date 4/26/83
William S. Bennett, Investigating Committee

Date 4/25/83
Charles T. Illsley, Investigating Committee

Date 4/25/83
C. Al Noble, Investigating Committee,
Trained Investigator

Date 4/26/83
Garvin T. Hewitt, Line Supervisor, Liquid Waste Processing

Date 4-28-83
Charles E. Wickland, Manager, Waste Operations

Date 5-5-83
R. E. Yoder, Director, HS&E

Date 5-4-83
E. Vejvoda, Director, Plutonium Operations

Date 5-4-83
G J Steppen, HS&E Area Representative

W D Crossland, Plant Director, Support Operations Date

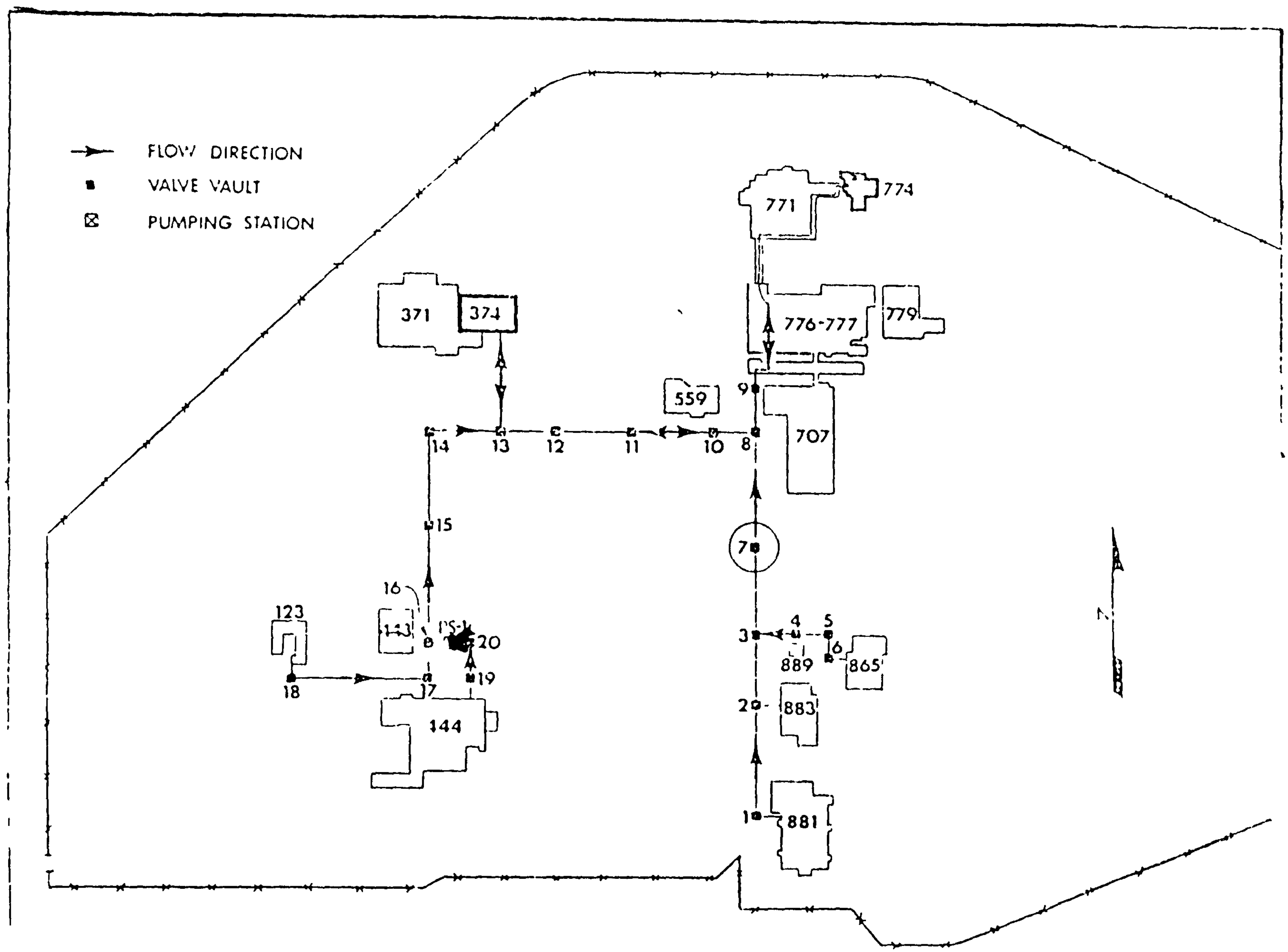


Figure 1 Process Waste Collection Transfer System

FIGURE 1

VALVE VAULT # 7

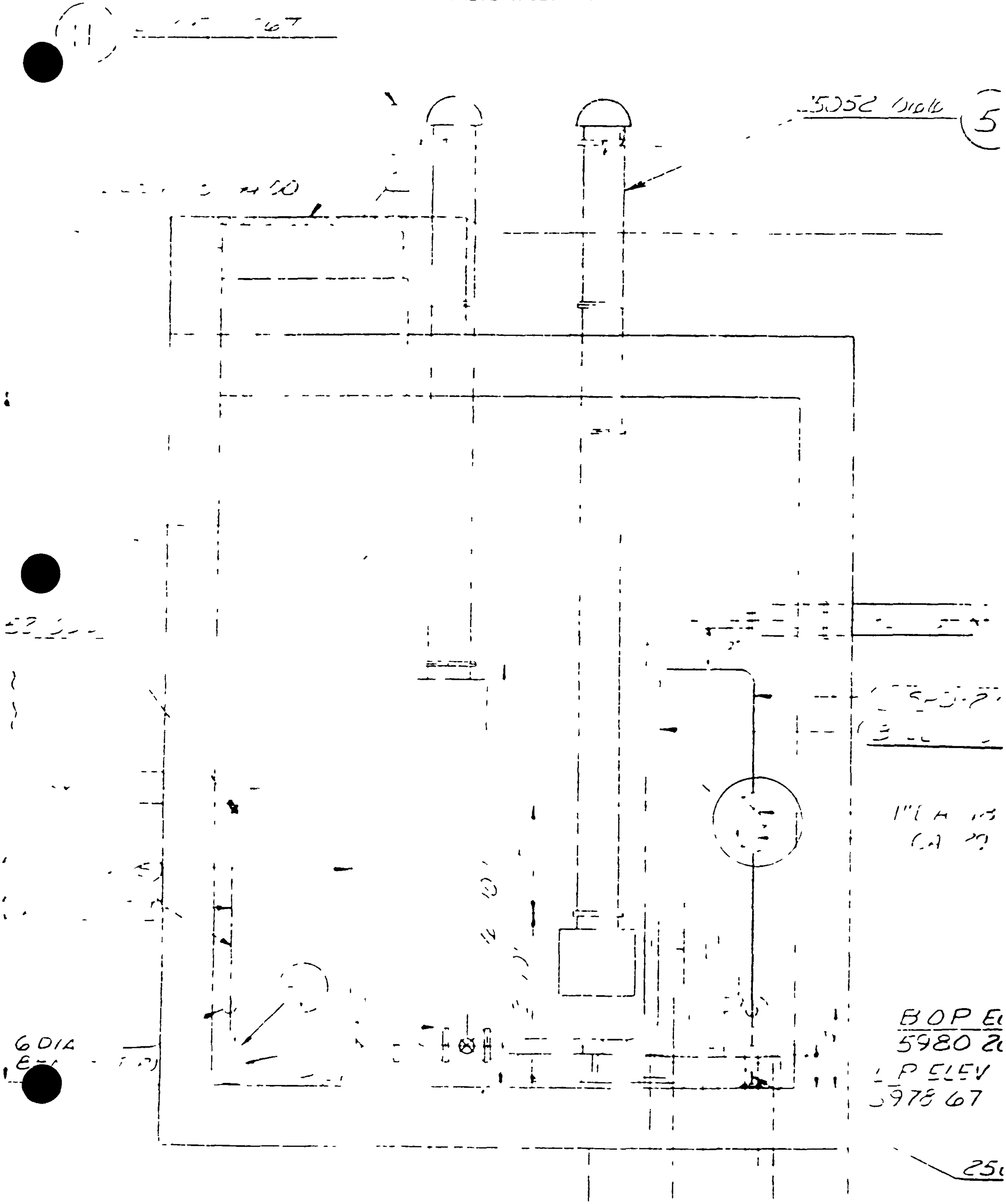
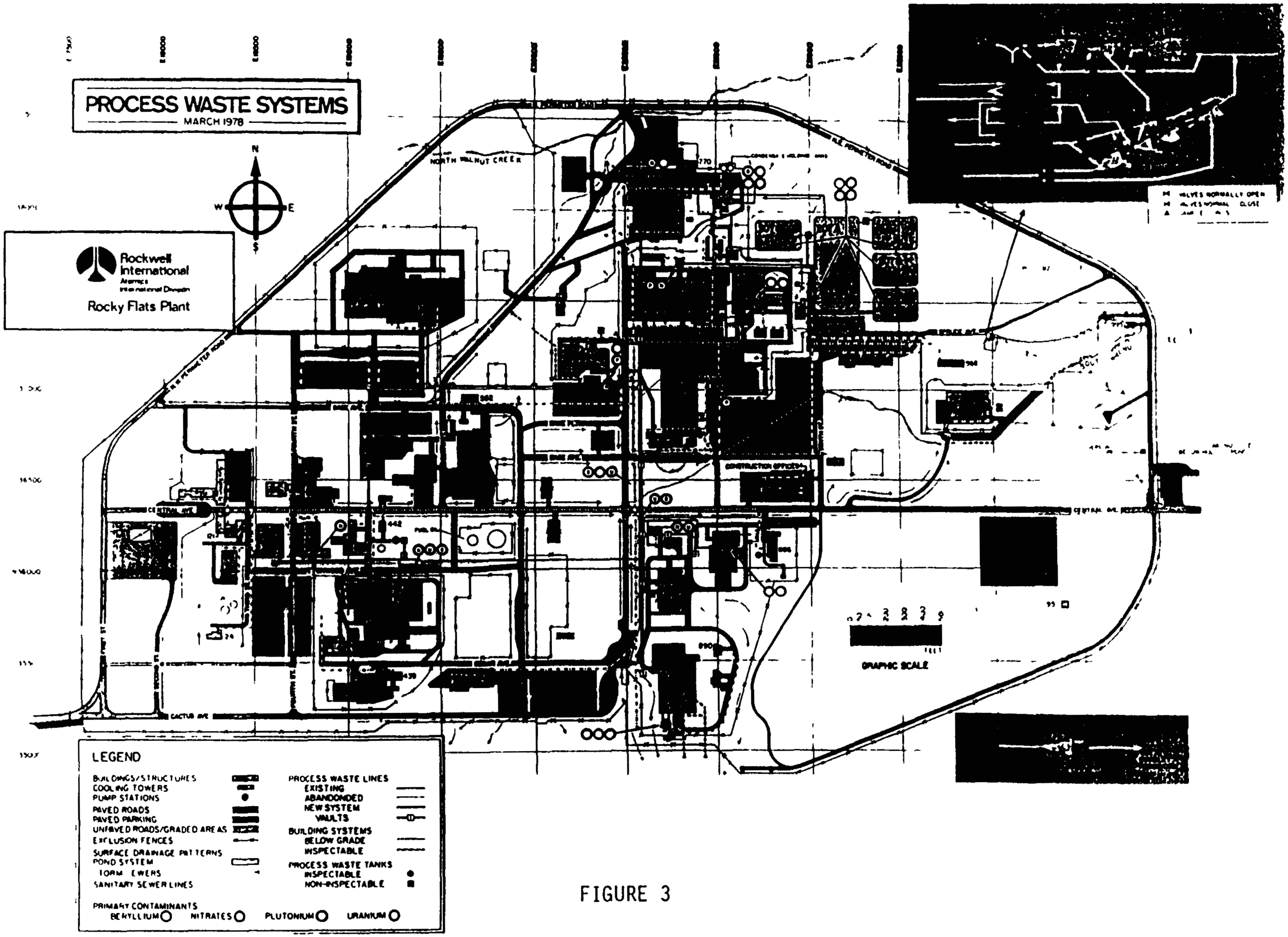


FIGURE 2



PROCESS WASTE SYSTEMS
MARCH 1978
N
W
E
S
Rockwell International
Rocky Flats Plant
NORTH WALNUT CREEK
CENTRAL AVE
CACTUS AVE
GRAPHIC SCALE
LEGEND
BUILDINGS/STRUCTURES
COOLING TOWERS
PUMP STATIONS
PAVED ROADS
PAVED PARKING
UNPAVED ROADS/GRADED AREAS
EXCLUSION FENCES
SURFACE DRAINAGE PATTERNS
POND SYSTEM
SANITARY SEWER LINES
PROCESS WASTE LINES
EXISTING
ABANDONDED
NEW SYSTEM
VAULTS
BUILDING SYSTEMS
BELOW GRADE
INSPECTABLE
PROCESS WASTE TANKS
INSPECTABLE
NON-INSPECTABLE
PRIMARY CONTAMINANTS
BERYLLIUM
NITRATES
PLUTONIUM
URANIUM

FIGURE 3

ATTACHMENT NO 1

SEQUENCE OF EVENTS
LEADING UP TO OCCURRENCE

March 10, 1983 - Alarm in Valve Vault (VV) #7 activated An inspection of the vault revealed the presence of moisture but no accumulation of water. The alarm remained in the activated state even though no water was present (could not reset alarm)

March 11, 1983 - A work order was submitted to repair the system. Transfer through VV #7 was allowed to continue to avoid shutdown of operations in buildings upstream of the vault.

March 28, 1983 - Alarms in VV's 1, 3, 4, 5 and 6 activated. VV #7 was still in the activated alarm state since the March 10 occurrence. The alarm in VV #2 did not activate.

March 29, 1983 - (Midnight Shift) VV's 1, 2, 3, 4, 5 and 6 were inspected. Moisture was present, but no accumulation of water All alarms were reset to the nonactivated state. VV #7 could not be inspected because it was under the security fence.

April 2, 1983 - A second attempt to gain access to VV #7 was unsuccessful.

SEQUENCE OF EVENTS DURING AND AFTER DISCOVERY OF OCCURRENCE - as obtained through inverviews with the following individuals

- J Suthern - S&W
- J. D Tadolini - Plant Protection
- L. P Ferris, III - Shift Superintendent
- J. L DiRocchi - Liquid Waste Operations
- J D Morrison - Liquid Waste Operations

All times listed are approximate

8 30 J. D Morrison began pumping operations to transfer liquid waste from Building 881 to Building 374 At approximately the same time,

J. Suthern, S&W, drove his snow plow into the Building 776 area to clear snow After completing the snow removal assignment, Mr Suthern drove onto Sage Avenue While driving on Sage, he noticed a rising stream of water from VV #7 He proceeded to Portal #1 Guard Shack to report the sighting to the guard on duty.

09 57 The guard on duty, Patrolman Paul Beights, radioed Captain Tadolini.

10 00 Captain Tadolini called Dispatch to notify Utilities. The Shift Superintendent heard radio transmissions concerning the incident but did not respond, because there is a Utilities steam pit at the approximate location of VV #7

10.05 Utilities foreman determined the problem was in a transfer pit and not a Utilities problem. Captain Tadolini requested Shift Superintendent assistance

10:10 Plant Protection notified R. E Brady, Liquid Waste Processing Foreman, Building 374 Brady, in turn, notified J. D Morrison, Waste Tank Operator, that there was a problem with VV #7. After checking the vault problem, Morrison returned to Building 881 to shut down the pumping operation and called for access to the vault area.

10.30 Morrison entered the valve vault area. The Shift Superintendent arrived on the scene

10 50 C Illsley.(Environmental) arrived at scene

10 55 S&W employee, Suthern, dammed the ditch east of the guard shack at Portal #1 Illsley noticed drainage was running across the old 750 parking lot, through the Building 991 normal run-off drainage Another dam was made just west of Guard Shack 762 to stop the liquid's flow from entering the drainage ditch

A water sample was taken from VV #7.

11 00 Sample was taken from storm drain near Building 995

11 05 Pond B-4 was sampled

2.00 Pumping of liquid from VV #7 into tanker truck began.

2 30 South Walnut Creek was diverted into Pond B-1.

5·30 The second series of samples was taken from the following locations

1 Ditch above dam on Sage
2 Storm drain near Building 995
3. Pond B-1
4. Pond B-4

PHOTOGRAPHIC LEGEND

Photograph No	
1	External view of Valve Vault #7 (VV #7) showing the location of the vault beneath the security fence Access to the vault can be gained only after Security personnel open the overhead gate
2	Internal view of VV #7 showing vault after water was pumped out and the vault cleaned
3	Main electrical box which was inundated The entire electrical system had to be replaced.
4	The upper alarm system is designed to activate when seepage water collects inside the poly bottle through the small conduits (normally inside the bottle)
5	Shows the incoming high level line (open) and low-level line (closed). Seepage is collected from outer pipe
6	Water entered the sump through the sump pump line The location of the faulty check valve is shown to the right and above the gauge. The lower alarm system is located beneath the sump pump.
7	The upper view of the sump pump line shows the sump line connecting with the high-level line
8	The check valve housing was removed to examine the check valve
9	The interior view of the check valve housing shows one flap on the check valve is missing.
10	This photo shows the check valve after removal from the housing. The missing flap would be located to the right of the center screw The cleavage edge of the rubber can be seen just above the metal trough

Valve Vault Level Alarm

Charge No	Suffix No	Order No	Sub No	Equipment Management No	Order No	Sub No
371	553	543050				

Responsible User	Phone No	Room	For Building	Approved By
Robert E Brady	4483	4	374	Robert E Brady

Work Permit Required?	Collect Costs?	Completion Review Required?	Todays Date	Date Needed
Yes X No ☐	Yes ☐ No X	Yes [ ] No X	3-11-83	3-11-83

Pre Killing Required NO ☐ YES ☐ | Shop ☐

WORK ANALYSIS (Show Craft) | Ref No | Time | Total Time

USER PLEASE FILL OUT ALL BLOCKS IN THIS SECTION

Furnish Labor And material To CHECK And Repair AS NECESSARY The Level Alarm For Valve Vault # 7

Alarm is on All The Time with No Liquid Problem Evident

JOB TITLE

Order No 543050 | Sub No

USERS COPY

COMPLETION REVIEW

Do not remove Do Not Operate tags until signed

MTCE Foreman

Request to User

Engineering Approval	Facility Q A Required YES NO	Engineering Required YES NO

HS&E Approval	Industrial Hygine	Nuclear Safety	Radiation Safety	Environmental Safety	Industrial Safety	Fire Safety

Reviewer Comments

RF 24950 (12/79)

ATTACHMENT NO 3

1/

6 064 87 ROCKY FLATS 10/12/87 KAJ

ORNL

DOW CHEMICAL, U S A., UNDATED (AROUND FALL 1983 TO EARLY 1984), "A HISTORICAL SUMMATION OF ENVIRONMENTA INCIDENTS AFFECTING SOILS AT OR NEAR THE U.S. AEC ROCKY FLATS PLANT." by J B OWEN & L.M. STEWART DRAFT.

– Soils under and around Bldgs 559, 771, 774, 776-777, 779 & 995 have become infiltrated w/ various radioactive and chemical mat'ls as a consequence of long-term, routine operations. Principal rad mat'l in these areas is Pu w/ minor amts of other radioisotopes & Pu decay products (Am^{241}). Major chemicals include nitrates, chromates (Cr^{+6}), organics (such as CCl_4), & in some locations, Beryllium.

Soils under Bldg. 707, are not considered operationally affected to the extent noted above.

Soils under & around Bldgs 441, 444, 447, 865, 881, 883, 886 & 889 are also infiltrated. Soils under Bldgs 122 & 123 are involved to a lesser degree. The major radioisotopes in these areas are enriched & depleted U, w/ the exception of possible extremely low levels of Pu under & around Bldg 122, 23 & 881 and minor U^{233} in Bldg 881. Enriched U spills @ & around Bldg 865 are considered as the only major possible contributions. Chemically, nitrates, chromates & Be infiltration are to be expected, especially in the 400 Complex & Bldgs 865 & 881

2/

[redacted]

DRAFT

TABLE I

The following buildings at Rocky Flats are currently known or suspected to be radioactively or chemically infiltrated. It is assumed that the soil under each building is similarly infiltrated.

Building	*Type Of Radioactive Infiltration	**Estimated Degree Radioactive Infiltration	Chemical Infiltration
122	Pu	Trace	Trace
123	Pu	Low	Moderate
125	Pu	Trace	Trace
331	EU	Trace	
334	EU	Trace	
439	DU	Trace	
440	DU	Trace	
441	DU	Trace	Moderate
442	DU	Low	Trace
444	DU	Low	Moderate
447	DU	Low	Low
559	Pu	Moderate	High
663	Pu	Trace	Trace
701	Pu	Low	Trace
707	Pu	Low	Trace
770	Pu	Low	Low
771	Pu	High	High
774	Pu	Moderate	Moderate
776	Pu	High	Low
777	Pu	Moderate	Low
778	Pu	Low	Low
779	Pu	Low	Moderate
865	DU	Low	Low
881	EU	Low	High
883	EU	Low	Trace
884	EU	Trace	
886	Pu	Trace	Trace
889	EU	Low	Moderate
991	Pu	Trace	

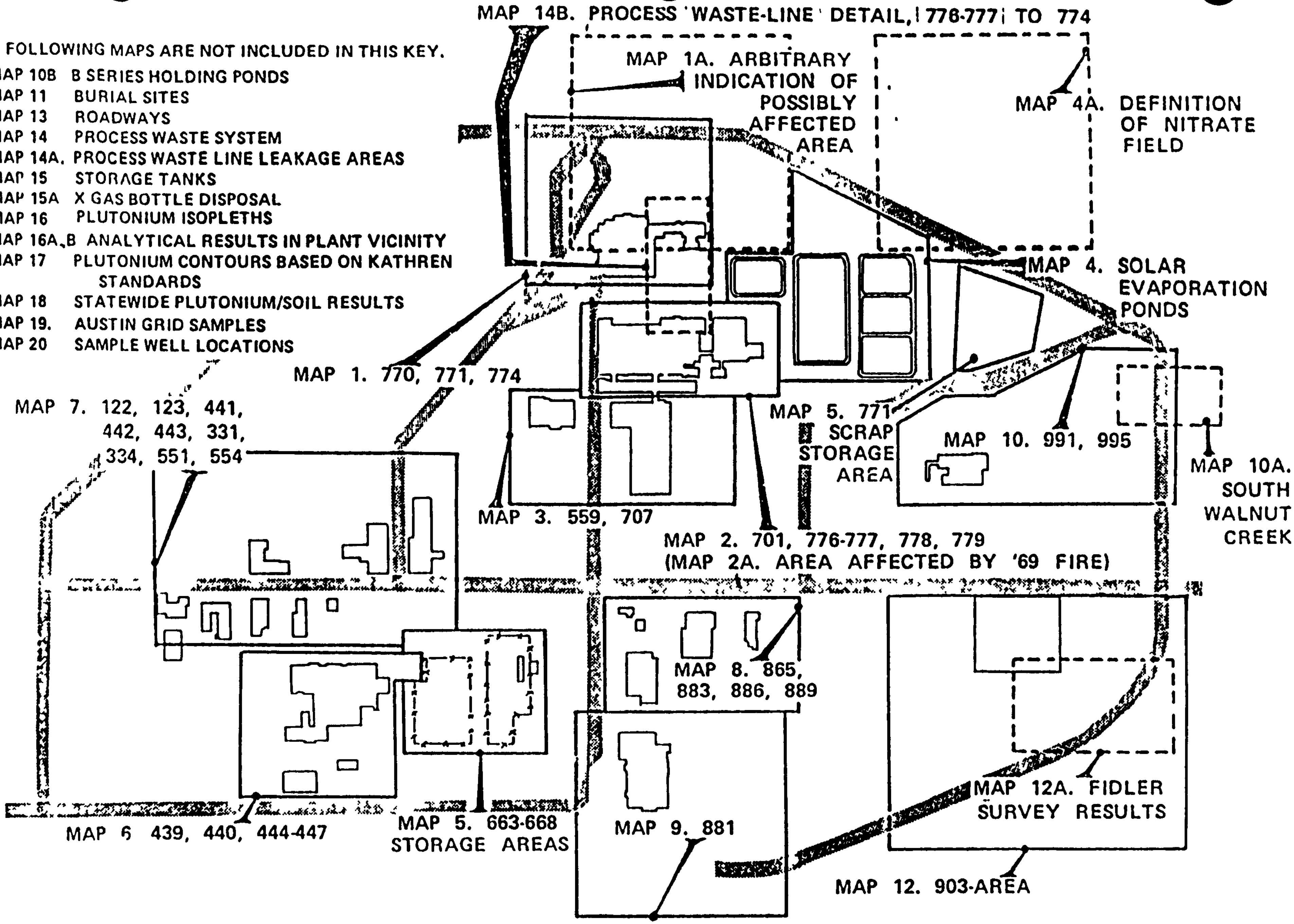
*Type of radioactive infiltration refers only to major radioactive material involved. Other radioactive elements are also involved but to lesser extent.

**Degree of infiltration refers to relative cost of cleanup.

[redacted]

THE FOLLOWING MAPS ARE NOT INCLUDED IN THIS KEY.

- MAP 10B B SERIES HOLDING PONDS
- MAP 11 BURIAL SITES
- MAP 13 ROADWAYS
- MAP 14 PROCESS WASTE SYSTEM
- MAP 14A. PROCESS WASTE LINE LEAKAGE AREAS
- MAP 15 STORAGE TANKS
- MAP 15A X GAS BOTTLE DISPOSAL
- MAP 16 PLUTONIUM ISOPLETHS
- MAP 16A,B ANALYTICAL RESULTS IN PLANT VICINITY
- MAP 17 PLUTONIUM CONTOURS BASED ON KATHREN STANDARDS
- MAP 18 STATEWIDE PLUTONIUM/SOIL RESULTS
- MAP 19. AUSTIN GRID SAMPLES
- MAP 20 SAMPLE WELL LOCATIONS



KEY TO SECTIONAL MAPS

31

[redacted]

DRAFT

TABLE II

Major Incidents in the Area of Buildings 770, 771, and 774 (See Map 1)

(Note: Pipeline leaks, etc., are discussed separately.)

Prior to 1956, the process waste holding tank located north of Building 771 overflowed on several occasions with minor impact.

1956 October: Process waste tanks (Building 774) overflowed, minor environmental infiltration.

1957 August: Leaking process waste tanks (Building 774), minor environmental infiltration cleaned up.

September: Building 771 fire - some environmental infiltration, particularly north and near the hatch on the southwest corner of the building. Actual levels unknown, soil and vegetation samples inconclusive.

1958 April: Soil infiltration noted at laundry outfall (Building 773), 17,400 dpm/g.

1963 January: Liquid containing plutonium spilled outside Building 774 entrance. Material cleaned up.

1964 January: Coveralls containing plutonium found on west dock of Building 771. Levels to 100,000 dpm/100 cm^2 found on dock and in locker room. Cleaned up immediately.

1968 May: Sewer line break at Building 771 resulted in sewage lift station tank overflow to Building 773 outfall. Low concentration of radioactive and chemical materials.

1970 May: Soil samples collected from Building 773 outfall; approximately 100,000 dpm/g. Plumbing modified in September 1970 and 149 drums of soil removed for off-site disposal. (Removal completed August 30, 1971.)

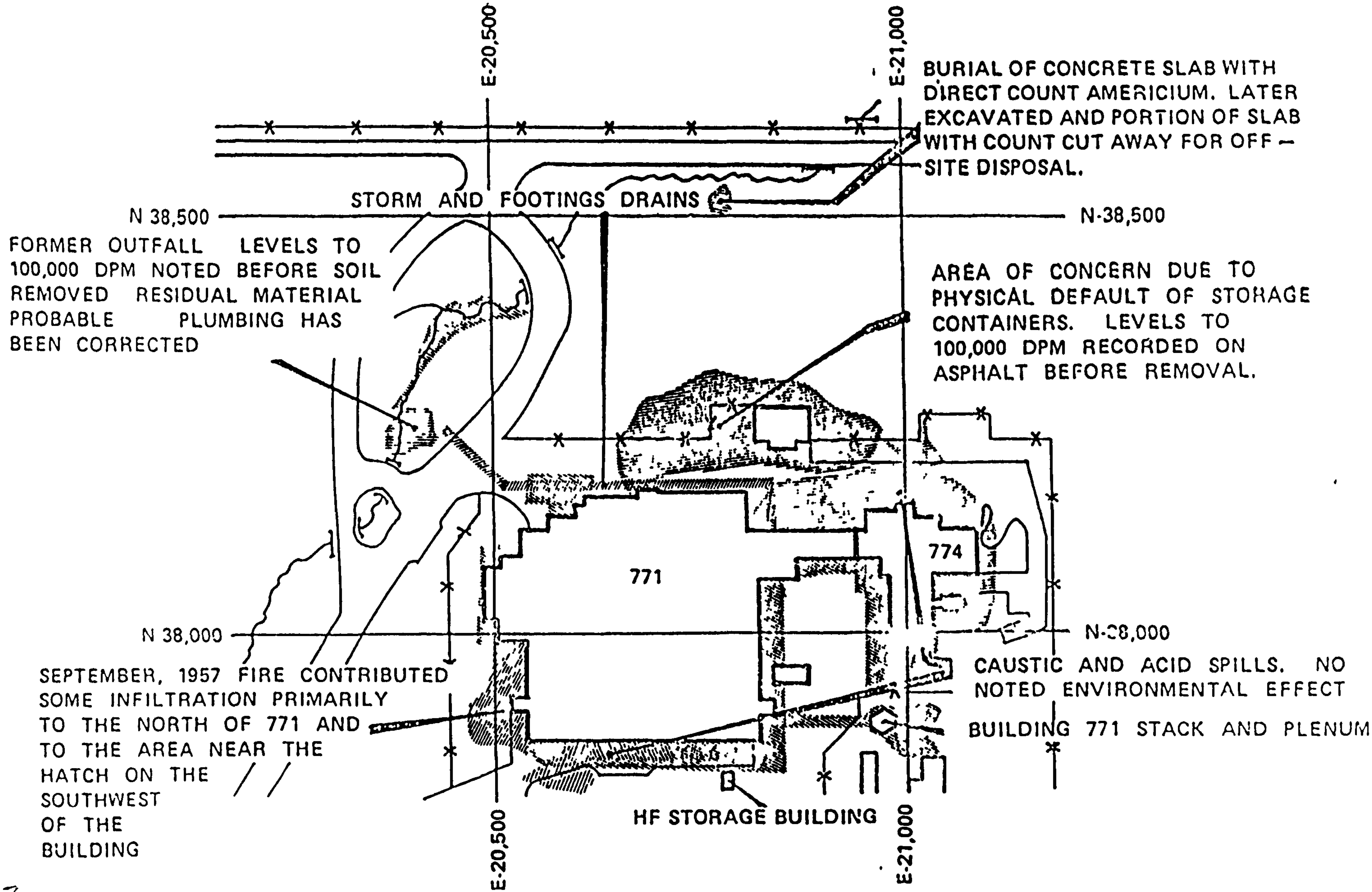
1971 Scrap drum leakage (June and July) resulted in recorded levels to 300,000 dpm/100 cm^2 on about 2,500 square feet of asphalt north of Building 771. Asphalt removed for off-site disposal. In September, construction excavation between Buildings 771 and 774 exposed tunnel which contains process waste line and which at one time was used as an exhaust ventilation duct for Building 774. The exposed cracks in the tunnel were sealed. Eight drums of soil (approximately 24 dpm/g) were removed for off-site disposal in January, 1972.

September: Building 774 dock - unknown source resulted in estimated levels to 200,000 dpm/100 cm^2. Thirty-six drums of soil removed for off-site disposal.

1972 March: Approximately 500 gallons of plutonium waste (approximately 350,000 dpm/liter) inadvertently released from Building 774. Pond samples showed only slight increase in activity. Started removing soil around Building 774 waste tanks for installation of new inspectable processing tanks.

August: A punctured scrap box and drum resulted in up to 200,000 dpm/100 cm^2 on approximately 3,600 square feet inside and approximately 500 square feet outside Building 770. Cleanup began immediately, soil and asphalt removed for off-site disposal.

1973 There were no incidents which were considered to have resulted in environmental infiltration.


E-20,500
E-21,000
BURIAL OF CONCRETE SLAB WITH DIRECT COUNT AMERICIUM. LATER EXCAVATED AND PORTION OF SLAB WITH COUNT CUT AWAY FOR OFF – SITE DISPOSAL.
STORM AND FOOTINGS DRAINS
N 38,500
N-38,500
FORMER OUTFALL LEVELS TO 100,000 DPM NOTED BEFORE SOIL REMOVED RESIDUAL MATERIAL PROBABLE PLUMBING HAS BEEN CORRECTED
AREA OF CONCERN DUE TO PHYSICAL DEFAULT OF STORAGE CONTAINERS. LEVELS TO 100,000 DPM RECORDED ON ASPHALT BEFORE REMOVAL.
771
774
N 38,000
N-38,000
SEPTEMBER, 1957 FIRE CONTRIBUTED SOME INFILTRATION PRIMARILY TO THE NORTH OF 771 AND TO THE AREA NEAR THE HATCH ON THE SOUTHWEST OF THE BUILDING
CAUSTIC AND ACID SPILLS. NO NOTED ENVIRONMENTAL EFFECT
BUILDING 771 STACK AND PLENUM
HF STORAGE BUILDING
E-20,500
E-21,000

Map 1

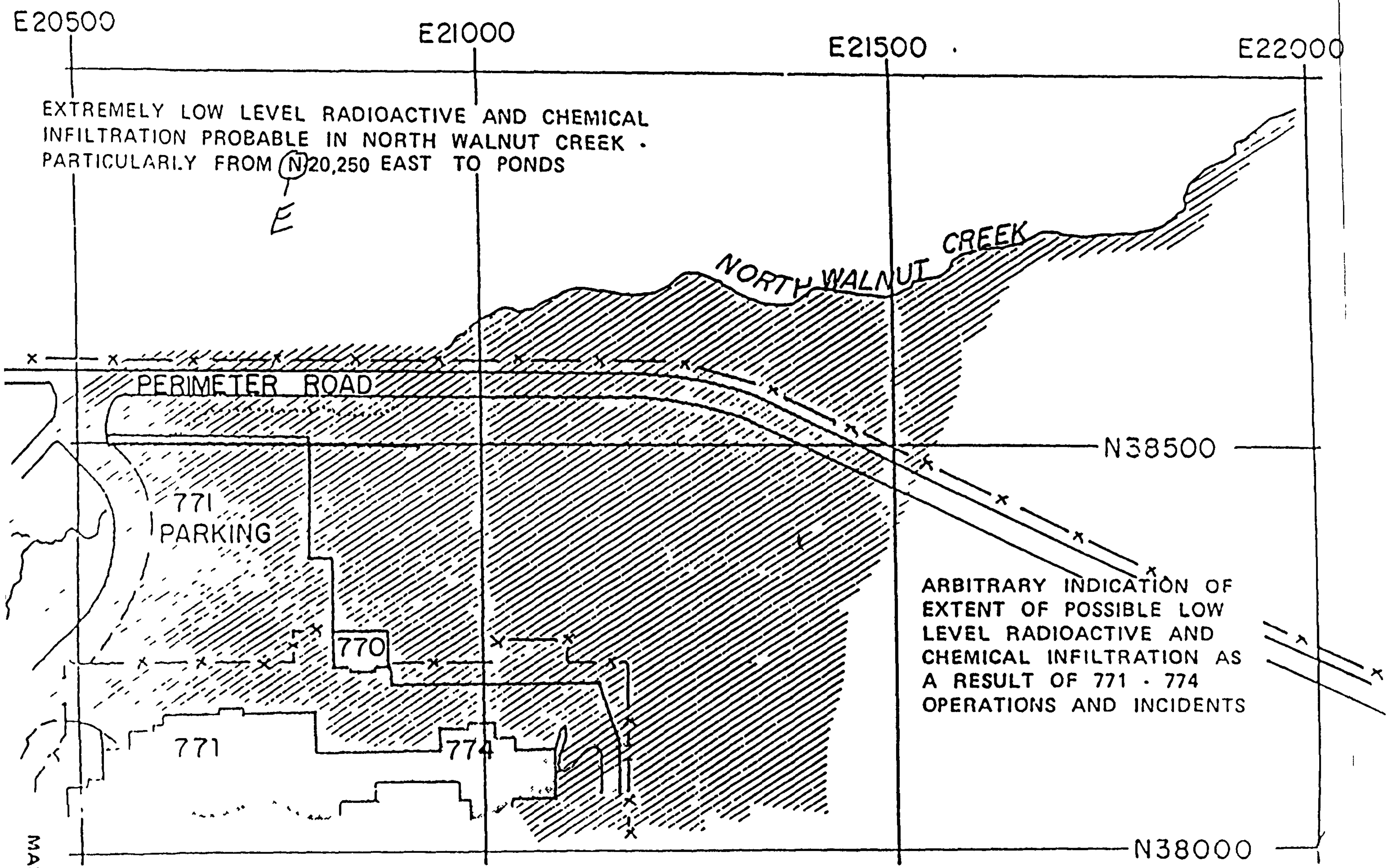
[redacted]

DRAFT

Map 1A

This map gives an arbitrary indication of possible affected areas as a result of operational incidents and accidents in the Buildings 770-771-774 area. As indicated, low level nitrate and radioactive infiltration is expected. Soil samples of the area justify this low-level assumption, with plutonium values ranging from undetectable to 64.9 dpm/g.

It must also be emphasized that the variables inherent in soil sampling (i.e., particle size, type of soil, physical location, vegetation cover, etc.) and the state-of-the-art do not permit wholesale drawing of conclusions as to levels, accurate isocurie contours, etc. It is the nature of the technology that a "high" sample could be detected immediately adjacent to an undetectable one and vice versa. Where such contours have been derived, by one means or another, they will be incorporated into this report for reference. Wherever possible, however, actual sample results should be the only judgment criterion and will be so presented herein.



E20500
E21000
E21500
E22000
EXTREMELY LOW LEVEL RADIOACTIVE AND CHEMICAL INFILTRATION PROBABLE IN NORTH WALNUT CREEK - PARTICULARLY FROM N 20,250 EAST TO PONDS
E
NORTH WALNUT CREEK
PERIMETER ROAD
N38500
771 PARKING
770
771
774
ARBITRARY INDICATION OF EXTENT OF POSSIBLE LOW LEVEL RADIOACTIVE AND CHEMICAL INFILTRATION AS A RESULT OF 771 - 774 OPERATIONS AND INCIDENTS
N38000

MAP 1A

[redacted] DRAFT

Map 2 (Buildings 701, 776-777, 778, and 779)

In June 1964, an explosion within a glovebox in Building 776 resulted in extensive release of plutonium to the interior and some to the exterior, primarily north of that building.

A fire on May 11, 1969, released plutonium to all of Building 776-777 and areas of Buildings 771, 778, and 779. The integrity of the buildings involved, however, remained essentially intact and very little environmental infiltration can be attributed to the actual fire. Subsequent extinguishing efforts, and cleanup did, however, provide some contribution (Map 2A).

These two incidents are primarily responsible for soil infiltration in this area. The majority of the affected soil has either been removed or covered with asphalt. As examples, in September 1969, approximately 320 tons of soil and asphalt (containing an estimated 14 mg Pu) were removed from the west side of Building 776. An asphalt-covered area of about 10,000 square feet, north of Building 776-777, has levels of radioactivity of about 700 dpm/g. When this area was surveyed, no particular "hot spots" were found but the material was somewhat deep in places, particularly around a drain in the dock area. A French drain north of Building 776 may have contributed to some plutonium infiltration below the surface although no surface expression has been noted. Radioactive levels of up to 80,000 dpm/100 cm^2 were noted in October 1971, north of the Building 776 compressor shed directly under the gravel and the soil was subsequently removed for disposal.

More recent incidents, such as process waste backing up into a stool and sink in Building 701 (June 1972) have also contributed some degree of infiltration to the area in the vicinity of that structure. Also there has been some minor spillage of carbon tetrachloride into the soil at the storage tank near the southwest corner of Building 701. No significant environmental consequences are expected from this spillage.

[redacted]

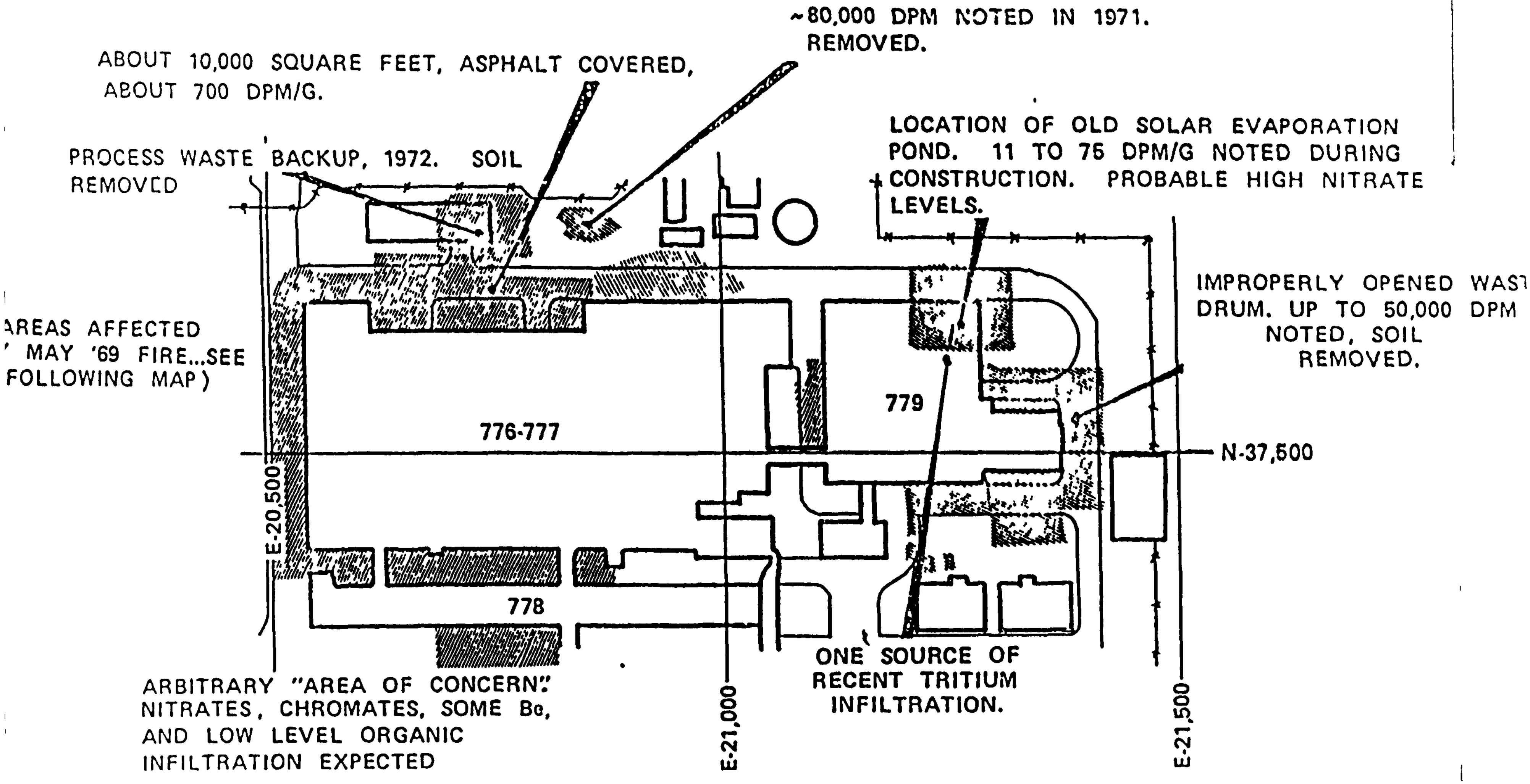
DRAFT

Building 779 was erected over the site of one of the original solar evaporation ponds. During excavation (September 1962) levels of radioactivity ranging from 11 to 75 dpm/g were noted, and later, pools of water in these excavations had levels to 150 dpm/l. The radioactive material involved was mostly uranium.

With the exception of the recent tritium incident and minor involvement in the 1969 fire, only one other major incident of environmental significance has been documented in Building 779. In June of 1969, an improperly opened waste drum resulted in radioactive material spread to the first floor, utility room, dock and adjacent grounds, and walkways east and south of the building, mostly by personnel tracking. Levels up to 50,000 dpm/100 cm^2 were recorded, and a number of drums of soil were subsequently removed for off-site disposal.

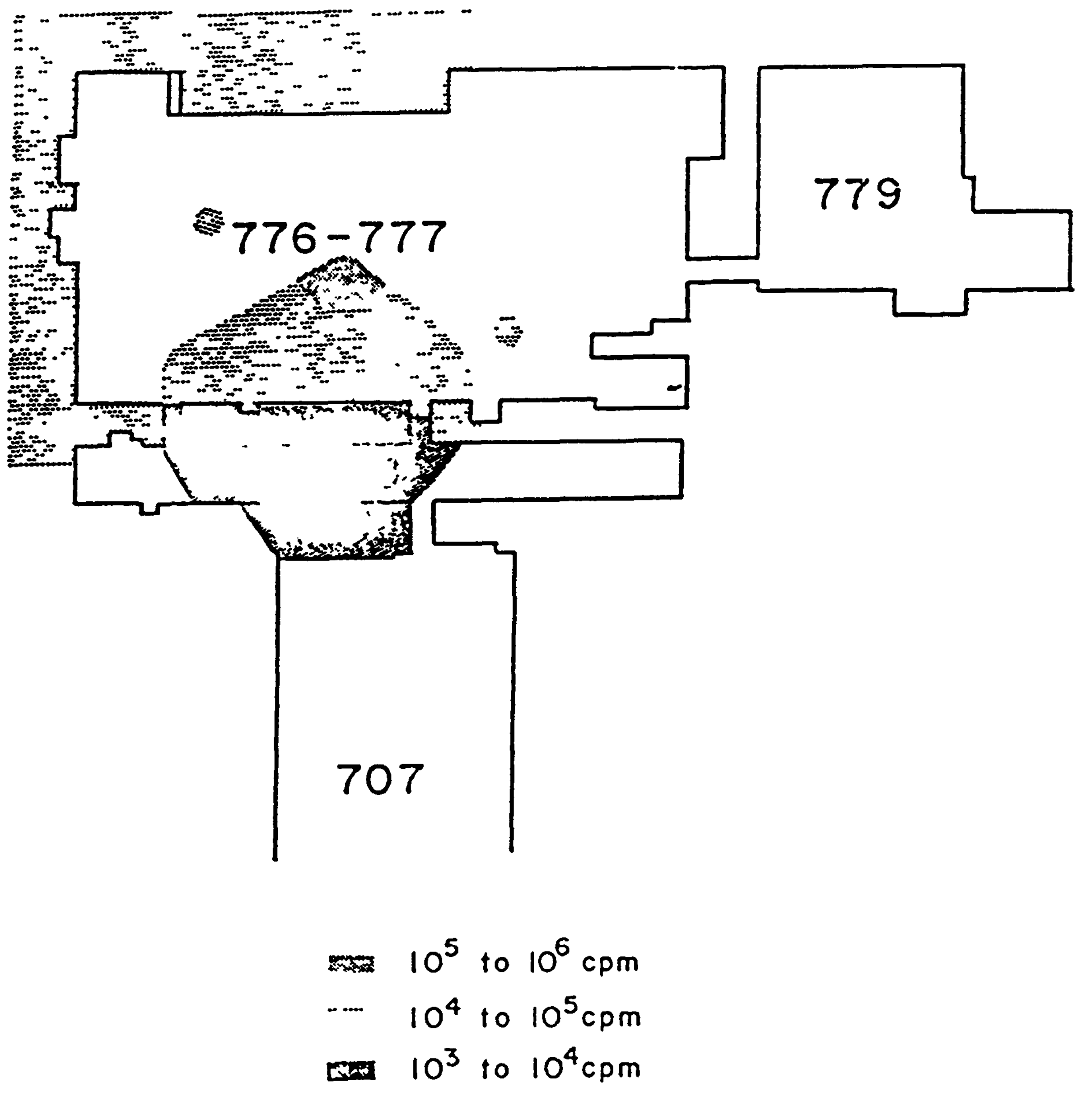
Thus the entire Buildings 776-777, 778, and 779 areas (including substructures) must be considered at least partially infiltrated with radioactive materials primarily on the north side of the complex, the west side of Building 776, between Buildings 777 and 779, and the courtyard between Buildings 776-777 and 778.

Some chemical infiltration, notably nitrates, chromate, and particularly in and near Building 776, possible organics (CCl_4), is to be expected, particularly beneath and north of the buildings.


~80,000 DPM NOTED IN 1971.
REMOVED.
ABOUT 10,000 SQUARE FEET, ASPHALT COVERED,
ABOUT 700 DPM/G.
PROCESS WASTE BACKUP, 1972. SOIL
REMOVED
LOCATION OF OLD SOLAR EVAPORATION
POND. 11 TO 75 DPM/G NOTED DURING
CONSTRUCTION. PROBABLE HIGH NITRATE
LEVELS.
IMPROPERLY OPENED WAST
DRUM. UP TO 50,000 DPM
NOTED, SOIL
REMOVED.
AREAS AFFECTED
MAY '69 FIRE...SEE
FOLLOWING MAP)
779
776-777
N-37,500
E-20,500
778
ARBITRARY "AREA OF CONCERN":
NITRATES, CHROMATES, SOME Be,
AND LOW LEVEL ORGANIC
INFILTRATION EXPECTED
E-21,000
ONE SOURCE OF
RECENT TRITIUM
INFILTRATION.
E-21,500

MAP 2.

ROOF AND OUTSIDE AREAS



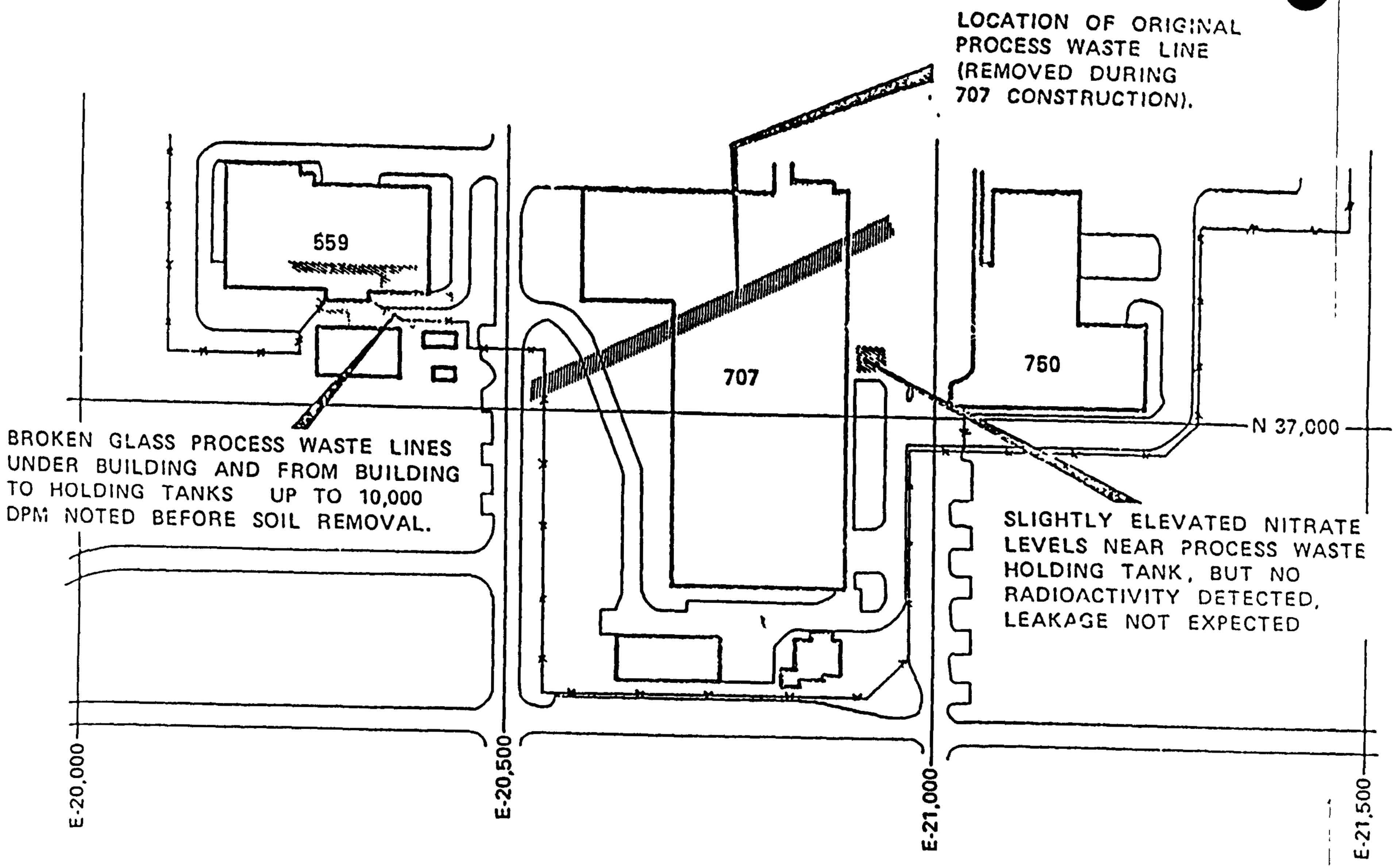
EXTERIOR AREAS OF 776-777 AND 778 AFFECTED IN AFTERMATH OF MAY, 69 FIRE

MAP 2A

Map 3 (Buildings 559 and 707)

The Service Laboratory Facility, Building 559, began operation in March 1968. Original process waste pipelines under the building were made of Pyrex® glass to combat a persistent corrosion problem. Operations and natural settling of the building have resulted in several breaks in this glass line, which are discussed in conjunction with Map 14.

Building 707, the newest production complex, has created no known environmental infiltration. Before construction, however, a section of the original process waste line (see Map 14) was removed and some residual material might be in residence. A sampling well (see Map 20) located near the process waste holding tank (between Buildings 707 and 750) has produced slightly elevated nitrate levels, but this could be due to a number of factors. No radioactivity has been detected in these samples, therefore, no leak or infiltration is assumed.


LOCATION OF ORIGINAL PROCESS WASTE LINE (REMOVED DURING 707 CONSTRUCTION).
559
707
750
N 37,000
BROKEN GLASS PROCESS WASTE LINES UNDER BUILDING AND FROM BUILDING TO HOLDING TANKS UP TO 10,000 DPM NOTED BEFORE SOIL REMOVAL.
SLIGHTLY ELEVATED NITRATE LEVELS NEAR PROCESS WASTE HOLDING TANK, BUT NO RADIOACTIVITY DETECTED, LEAKAGE NOT EXPECTED
E-20,000
E-20,500
E-21,000
E-21,500

MAP 3

[redacted]

DRAFT

Map 6 (Buildings 439, 440, and 444-447)

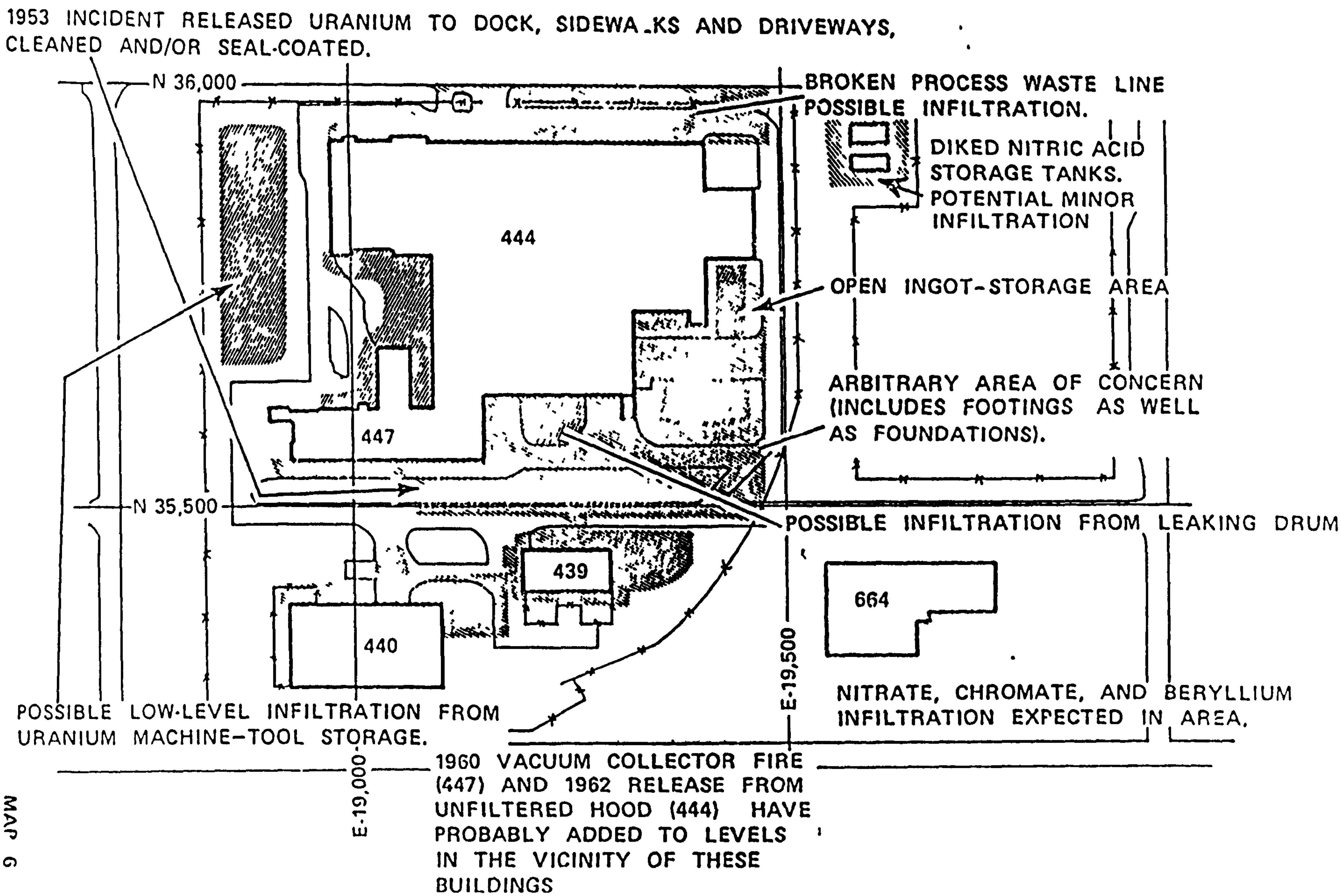
Depleted and enriched uranium and beryllium are the principal materials of concern to this area.

In 1953, high winds blew the lids off waste drums and uranium was released to the dock, driveway, and surrounding grounds. Direct count as high as 7,500 dpm/100 cm^2 and smears as high as 350 dpm were reported. The docks and sidewalks were cleaned up and the driveway areas seal-coated. A broken process waste line (June 1966) north of the building resulted in some possible infiltration as did leaking storage drums south of the building. An open ingot storage area east of Building 444 and a metal storage area south of the building have undoubtedly resulted in low-level infiltration of the soil, as has a uranium machine tool storage area west of the building. Bldg 444

In May 1960, a vacuum collector fire in Building 447 resulted in approximately 44 µCi depleted uranium deposited on the roof of the building. In December 1962, a uranium/beryllium release from Building 444 (due to use of an unfiltered hood) was noted.

Thus, these areas immediately adjacent to Buildings 439, 440, and 444-447, as well as the storage areas noted on Map 6, must be considered radioactively infiltrated to some degree as should the footings and foundations of these buildings.

Chemically, no specific incidents have been noted, but routine generation of nitrates and chromates would indicate at least the possibility of these materials being present in soil under and around these buildings.


1953 INCIDENT RELEASED URANIUM TO DOCK, SIDEWA_KS AND DRIVEWAYS, CLEANED AND/OR SEAL-COATED.
N 36,000
N 35,500
E-19,000
E-19,500
444
447
439
440
664
BROKEN PROCESS WASTE LINE POSSIBLE INFILTRATION.
DIKED NITRIC ACID STORAGE TANKS.
POTENTIAL MINOR INFILTRATION
OPEN INGOT-STORAGE AREA
ARBITRARY AREA OF CONCERN (INCLUDES FOOTINGS AS WELL AS FOUNDATIONS).
POSSIBLE INFILTRATION FROM LEAKING DRUM
NITRATE, CHROMATE, AND BERYLLIUM INFILTRATION EXPECTED IN AREA.
POSSIBLE LOW-LEVEL INFILTRATION FROM URANIUM MACHINE-TOOL STORAGE.
1960 VACUUM COLLECTOR FIRE (447) AND 1962 RELEASE FROM UNFILTERED HOOD (444) HAVE PROBABLY ADDED TO LEVELS IN THE VICINITY OF THESE BUILDINGS

MAP 6

[redacted]

Map 7 (Buildings 122, 123, 331, 334, 441, 442, 443, 551, and 554)

Building 122 (Medical Facility), with its extremely low level waste-liquid generation, operated with a 55-gallon drum as a waste tank. Rusting of this drum and subsequent leakage resulted in some low-level infiltration of soil under the building and the removal of a section of the floor inside (southeast corner) the building. Significant infiltration is not suspected and has not been detected in areas around the building.

Building 123 (Health Physics Laboratories) generates low-level radioactive liquid waste as well as chemical wastes. Known or suspected underground waste-line leakage has contributed some material to the soil beneath the building. Leakage, however, also appears to be into the lines due to high hydrostatic pressure, thus minimizing the potential.

Building 441 was originally a laboratory handling small quantities of radioactive material as well as quantities of various chemicals. Thus, the soil and piping beneath the building must be considered suspect in regard to both chemical and radioactive infiltration.

The Laundry, Building 442, is also potentially affected by both radioactive and chemical materials, notably depleted uranium and beryllium, and in 1964 the Laundry was infiltrated by enriched uranium, impregnated in clothes from Building 883. The soil in the vicinity of this building has also been affected by instances of radioactivity release. For example, in December 1963, rag-cleaning barrels stored near the building either leaked or spilled. The liquid drained east into the ditch on the northwest side of the building. Radioactivity was detected as far east as the east end of Building 551. Cleaning efforts and subsequent runoff has reduced concentrations in that area to a low level.

Building 443, the Steam Boiler Plant, has had no known radioactive material involvement. Routine operations do involve chemicals,

[redacted]

DRAFT

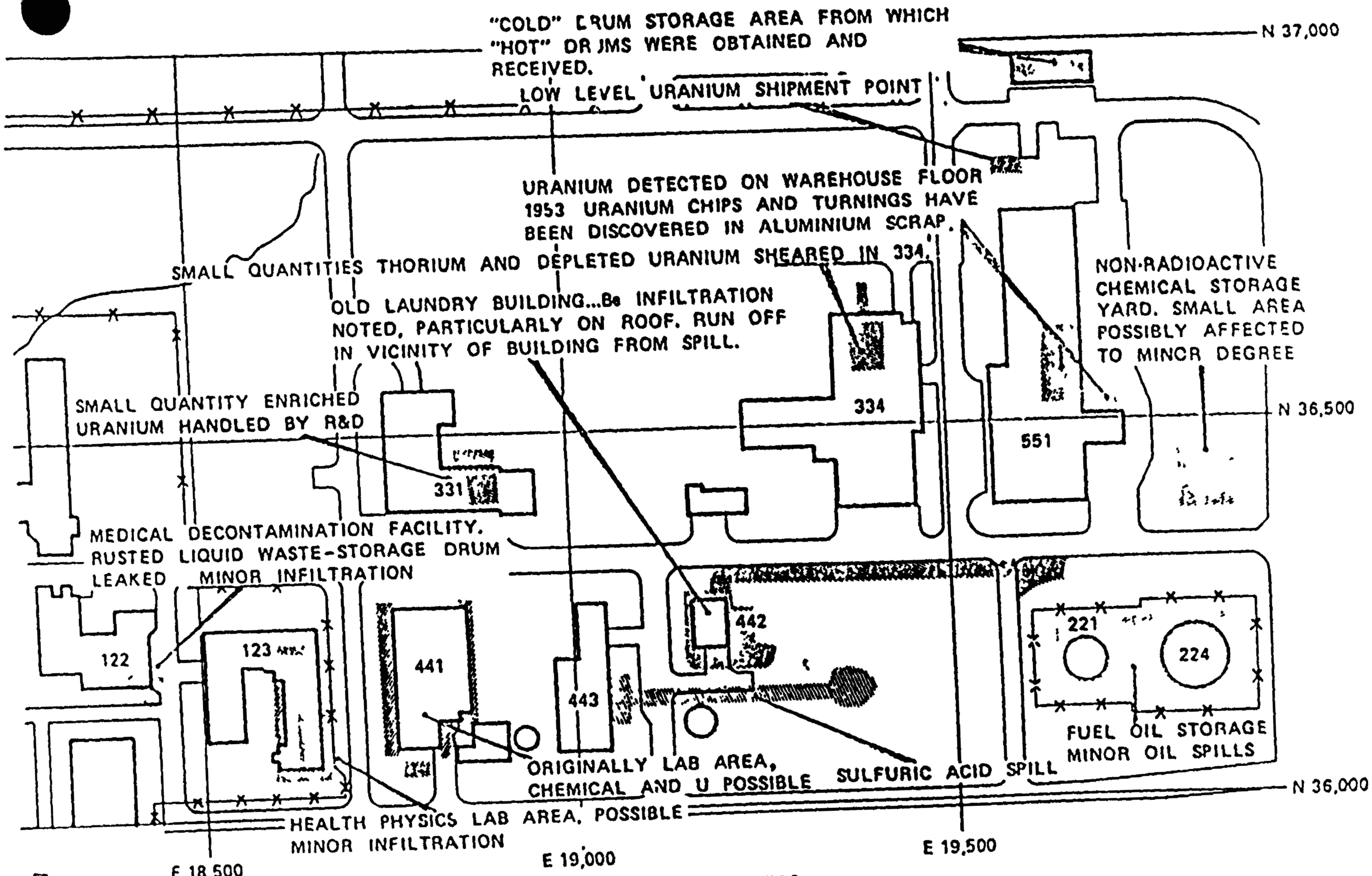
particularly sulfuric acid and sodium hydroxide The only incident of note occurred when a quantity of sulfuric acid was spilled to the environs of the building. The acid drained eastward (on the south side of Building 442) to a trap dug in the center of the lot which is now used for Building 444 parking. This soil in the area would undoubtedly be somewhat acidic, but no adverse effect on the environment has been noted.

A portion of Building 331, the Plant Garage, was at one time used for a special R&D effort involving depleted and enriched uranium. No incidents or releases were noted during this operation and no environmental residue is expected. Due to the repair and storage of vehicles there is possibility of organics such as oil and gasoline in the soil beneath the building.

Building 334, the main Maintenance Shop, was also used for special work involving the shearing of some depleted uranium. Some thorium has also been handled in Building 334, again, with no known incident. No environmental encroachment of any material has been detected or is expected as a result of operations in this building.

The Warehouse, Building 551, and adjacent grounds, have been areas of concern several times. For example, detectable uranium was discovered on the Warehouse floor in April 1953. Uranium chips and turnings were discovered in an aluminum scrap pile near the Warehouse in 1963 and again in 1964. These were removed and the grounds cleaned. In July 1963 and again in 1970, Rocky Flats received equipment and drums from off site which contained uranium above the Rocky Flats acceptable level. In 1970 the entire shipment of 55-gallon drums was returned to that vendor. These and other minor incidents lead to at least suspect areas under and around Buildings 551 and 554 (where the "hot" drums were received). A small drum storage area east of Building 552 is suspect for the same reason.

There have been some minor leaks and spills from drums and storage containers in the non-radioactive chemical storage area east of Building 551. While a small area might have been affected, quantities involved have been so small that no impact has been noted nor expected. This area is used primarily to store drum quantities of acids, oils, soaps, and solvents.



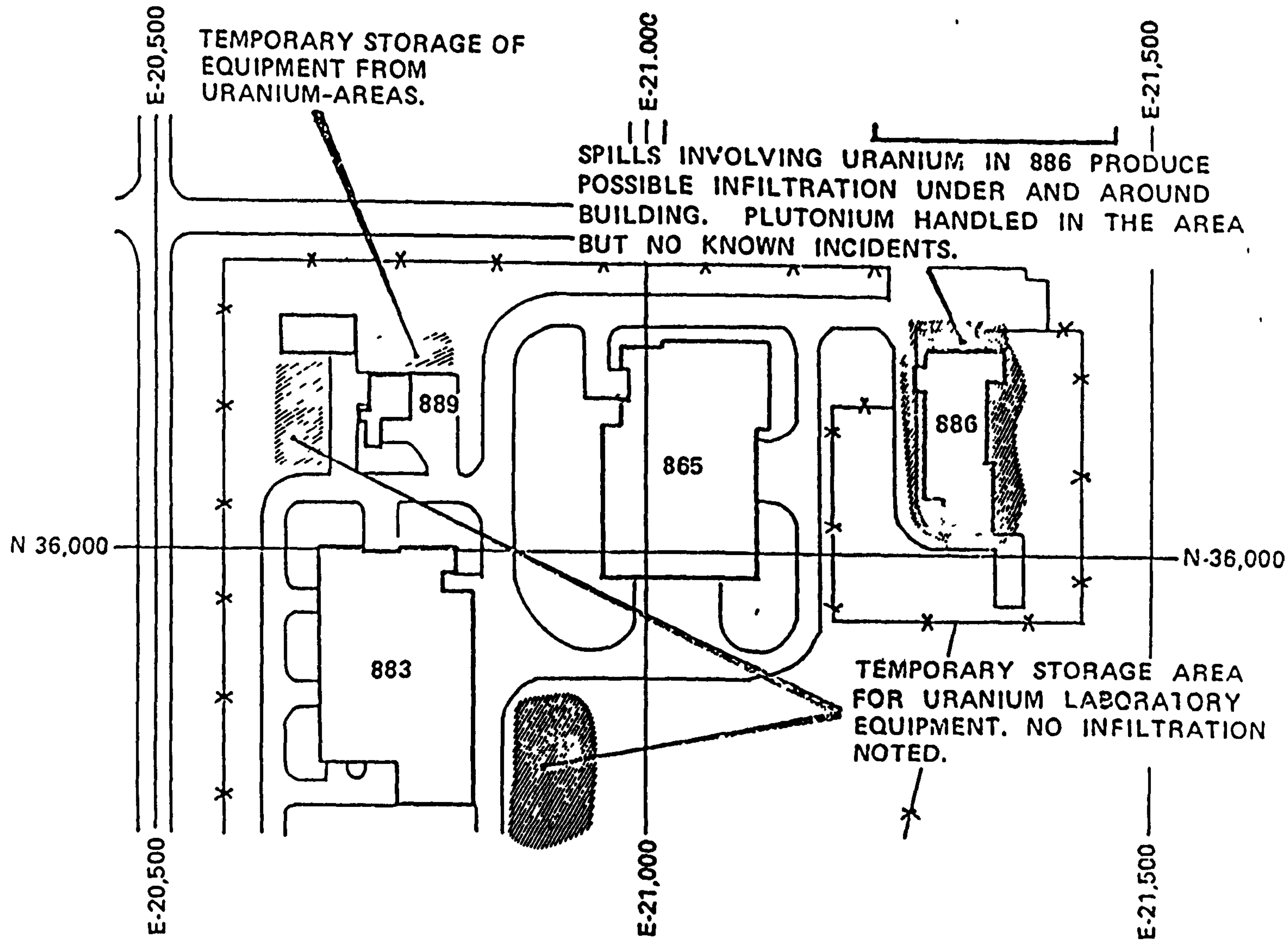
MAP 7

POTENTIAL ENRICHED OR DEPLETED URANIUM INFILTRATION AREAS. ALTHOUGH UNDETECTED, OPERATIONS PERFORMED IN THE NOTED AREAS MAKE LOW LEVEL INFILTRATION A PROBABILITY

[redacted]

Map 8 (Buildings 865, 883, 886, and 889)

Due to the nature of operations in these buildings, soil infiltration is expected to some degree under and possibly around these buildings. Spills involving uranium in Building 886 have occurred, with an inherent possibility of substructure infiltration. No specific incidents have been documented in the other buildings (with the exception of a January 1969 incident wherein the roofing was blown off Building 889 with no environmental effect). At one time, however, some equipment from a uranium laboratory was stored outside (just east) of Building 883 and west of Building 889. Present practice includes temporary storage of equipment from uranium areas on a pad north of Building 889 prior to processing. Therefore, these would also be areas of interest, although no incident or infiltration has been noted.


TEMPORARY STORAGE OF
EQUIPMENT FROM
URANIUM-AREAS.
SPILLS INVOLVING URANIUM IN 886 PRODUCE
POSSIBLE INFILTRATION UNDER AND AROUND
BUILDING. PLUTONIUM HANDLED IN THE AREA
BUT NO KNOWN INCIDENTS.
TEMPORARY STORAGE AREA
FOR URANIUM LABORATORY
EQUIPMENT. NO INFILTRATION
NOTED.
E-20,500
E-21,000
E-21,500
N 36,000
N-36,000
889
865
886
883

[redacted]

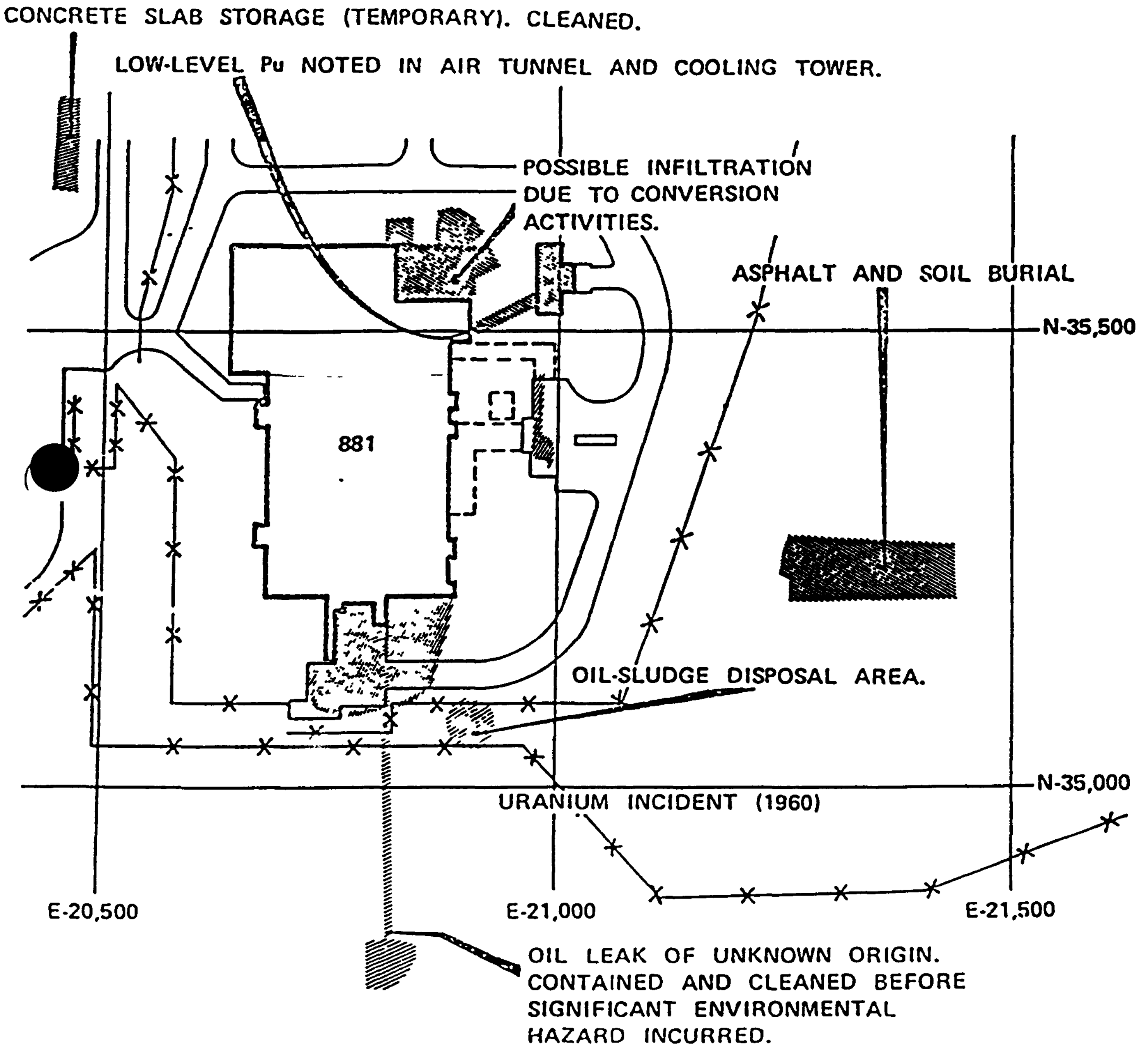
DRAFT

Map 9 (Building 881)

Building 881, originally a production building, was partially converted to a general support building in 1964 Although few incidents involving the building have been documented, it represents an area of interest, primarily due to the age of the structure (one of the original plant buildings). Both uranium (east dock February 1960) and plutonium (laboratory area October 1961 and 1968) incidents have been noted in the building and waste lines have been broken with resultant probable infiltration. Low levels of plutonium have been detected in the air tunnel and the cooling tower northeast of the building.

In addition to burial sites (see map), some exterior areas near Building 881 have been involved with radioactive material. An area of several hundred square feet northwest of the building was involved in 1958 when a concrete slab, removed from the east side of Building 776, was deposited there. The slab was broken up and removed and the area cleaned. Conversion activities also resulted in some possible infiltration, primarily to the northeast of the building.

In May 1973, oil (#6 fuel oil) from an undetermined source was discovered on the hillside below Building 881. Prompt action prevented the spread of the oil into Woman Creek or any holding pond. Leak tests on the Building 881 fuel tank and lines (the only known possible sources) did not show any leakage, but to date the oil continues to emerge through the Building 881 footings drain. A concrete skimmer dam has been built to trap the oil, which drains in extremely small quantities. The oil-soaked straw which was used to trap the material, as well as most of the soil involved, has been removed.


CONCRETE SLAB STORAGE (TEMPORARY). CLEANED.
LOW-LEVEL Pu NOTED IN AIR TUNNEL AND COOLING TOWER.
POSSIBLE INFILTRATION DUE TO CONVERSION ACTIVITIES.
ASPHALT AND SOIL BURIAL
N-35,500
881
OIL-SLUDGE DISPOSAL AREA.
N-35,000
URANIUM INCIDENT (1960)
E-20,500
E-21,000
E-21,500
OIL LEAK OF UNKNOWN ORIGIN. CONTAINED AND CLEANED BEFORE SIGNIFICANT ENVIRONMENTAL HAZARD INCURRED.

MAP 9

DRAFT

Map 10 (Buildings 991 and 995)

Building 991 and the associated storage vaults (tunnels 996, 997, 998, and 999) are also original plant structures and thus under suspicion due to age. Incidents involving very small quantities of plutonium, as well as uranium and beryllium, have been noted in Building 991, and extensive research activities have undoubtedly spread some trace concentrations of materials in the vicinity of the building.

Although radioactive materials have been continuously stored in the vault areas, routine surveys have indicated that with the possible exception of 996, which might be slightly uranium infiltrated, the vaults have remained remarkably "cold." Any environmental leakage has been in rather than out as determined by salt infiltration into the tunnel areas.

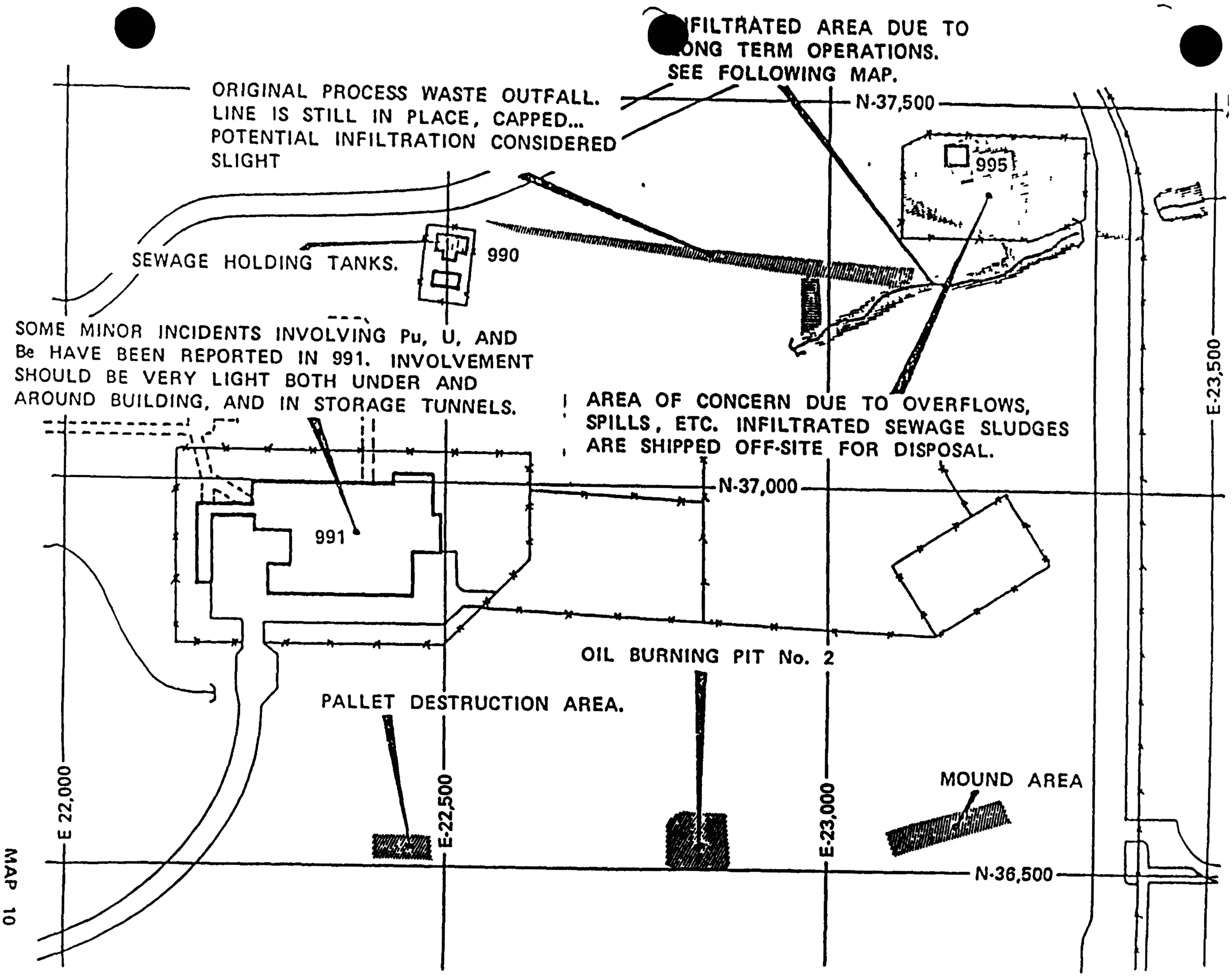
Building 995, the Sewage Treatment Facility, has historically been the recipient of effects from incidents in other areas of the plant. For example, the overflow incident in Building 701 (June 1972) contributed elevated levels of radioactive material (plutonium) to the Building 995 effluent and drying beds. In 1972, plumbing changes were initiated to channel all wastes through Building 995. The increased load thus generated lead to increasing radioactivity levels in sewage sludges which are shipped off site for disposal. Surge overflows and incidents involving spillage of the dried or drying sludge have created an area of concern which extends from the outlet of the South Walnut Creek diversion culvert to and through the B-series holding ponds, and surrounding the treatment area including both sides of the perimeter road east of Building 995.

The original process waste outfall (from Building 774) was located just west of the Building 995 outfall. The line was later rerouted to discharge further upstream. In 1972, the line was routed through Building 990 and then, through the sanitary sewer lines, into Building 995. The abandoned line is still in place. The area of the original outfall as well as the abandoned line are noted on Map 10 as areas of interest

Map 10A details soil sample results from a recent survey in the vicinity of Building 995. These results are only illustrative, as actual levels vary with flow rates through the creek bed.

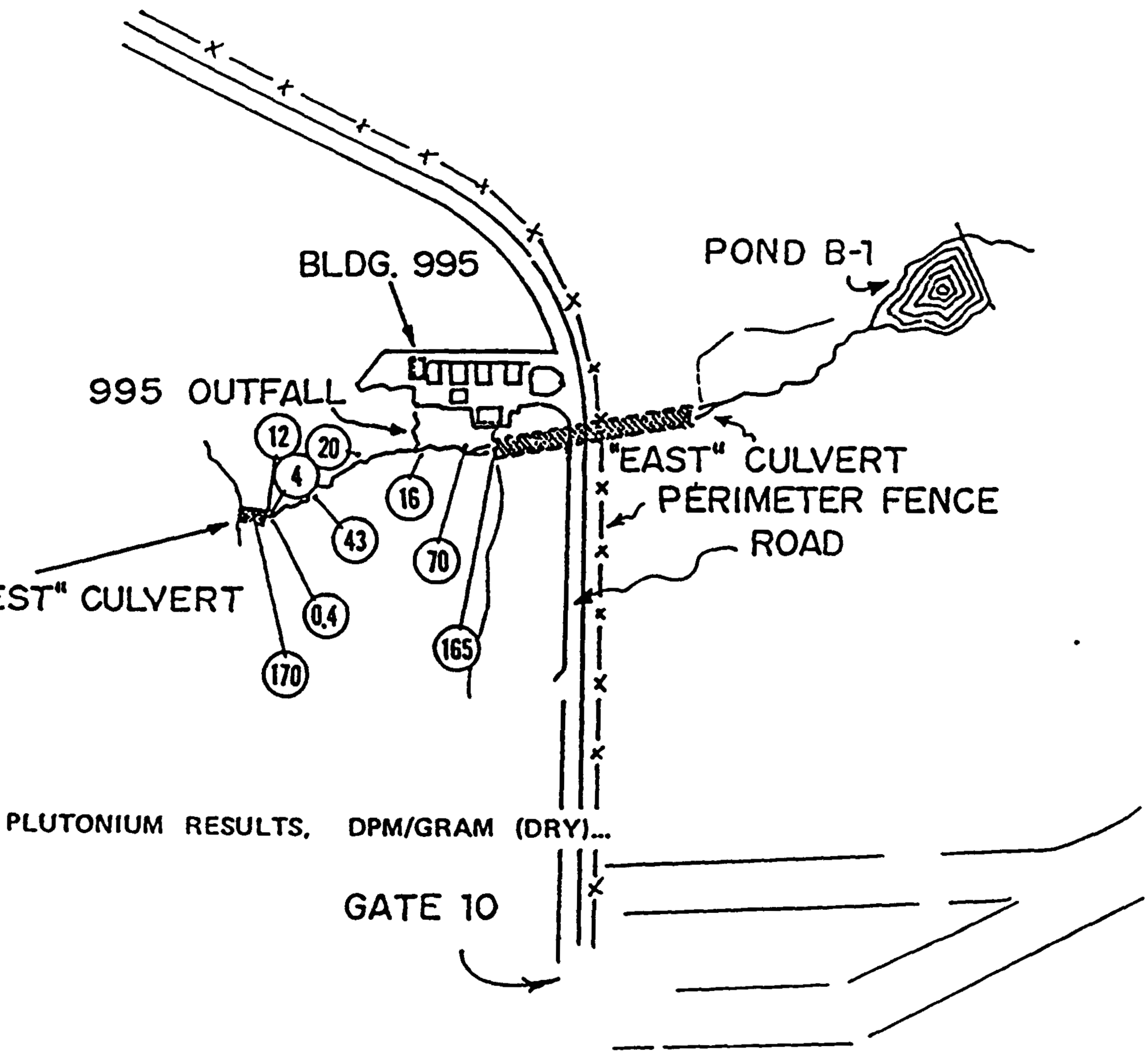
The B-series holding ponds are located in this area. Sediment sample results from all holding ponds taken in 1971 by the Radiobiology Department of Colorado State University (CSU), are detailed in Map 10B. The values given are questionable due to the analytical technique employed. Values shown may be high due to the presence of isotopic uranium or low due to inadequate sampling technique.

Regardless of the accuracy of the values shown in Map 10B, the B-series ponds must be considered an area of concern regarding both chemical and radioactive infiltration. Studies have shown that these ponds have performed what they were designed to do, provide residence time and holding capacity to allow materials to settle out, and in so doing have become infiltrated with those materials. It should be noted that the concentrations decrease throughout the system, which is further indication of the effectiveness of the ponds.



ORIGINAL PROCESS WASTE OUTFALL. LINE IS STILL IN PLACE, CAPPED... POTENTIAL INFILTRATION CONSIDERED SLIGHT
FILTRATED AREA DUE TO
ONG TERM OPERATIONS.
SEE FOLLOWING MAP.
N-37,500
995
990
SEWAGE HOLDING TANKS.
SOME MINOR INCIDENTS INVOLVING Pu, U, AND Be HAVE BEEN REPORTED IN 991. INVOLVEMENT SHOULD BE VERY LIGHT BOTH UNDER AND AROUND BUILDING, AND IN STORAGE TUNNELS.
AREA OF CONCERN DUE TO OVERFLOWS, SPILLS, ETC. INFILTRATED SEWAGE SLUDGES ARE SHIPPED OFF-SITE FOR DISPOSAL.
N-37,000
991
OIL BURNING PIT No. 2
PALLET DESTRUCTION AREA.
MOUND AREA
E 22,000
E-22,500
E-23,000
E-23,500
N-36,500

MAP 10



PLUTONIUM RESULTS, DPM/GRAM (DRY)...

MAP 10A

[redacted]

Map 14 (Process Waste Lines)

Map 14 details the process waste system at Rocky Flats, tankage, and possible major materials present in those tanks.

In an effort to reduce corrosion, original process waste lines had a saran-lined inner pipe enclosed in a protective clay tile pipe. This saran lining was very susceptible to leakage. Leaks were noted in 1952 and by 1956 most of the original pipe had been replaced with stainless steel. To date, all but about 600 feet of this line has been replaced. The remaining section was thoroughly tested in 1971 and was not leaking.

An exhaustive leak-test survey was conducted in 1971 by an off-site contractor. This leak test was conducted under pressure and disclosed several minor leaks, mostly in low-pressure (essentially gravity-flow) lines. Repairs were started immediately. Attempts were made to repair the higher pressure leaks in place. When these attempts failed, an alternate line was installed. The low leak-rate detected around joints in the gravity flow line is to be expected since this type line is not designed to operate under pressure. Lines have been observed under operational pressures and no leakage observed.

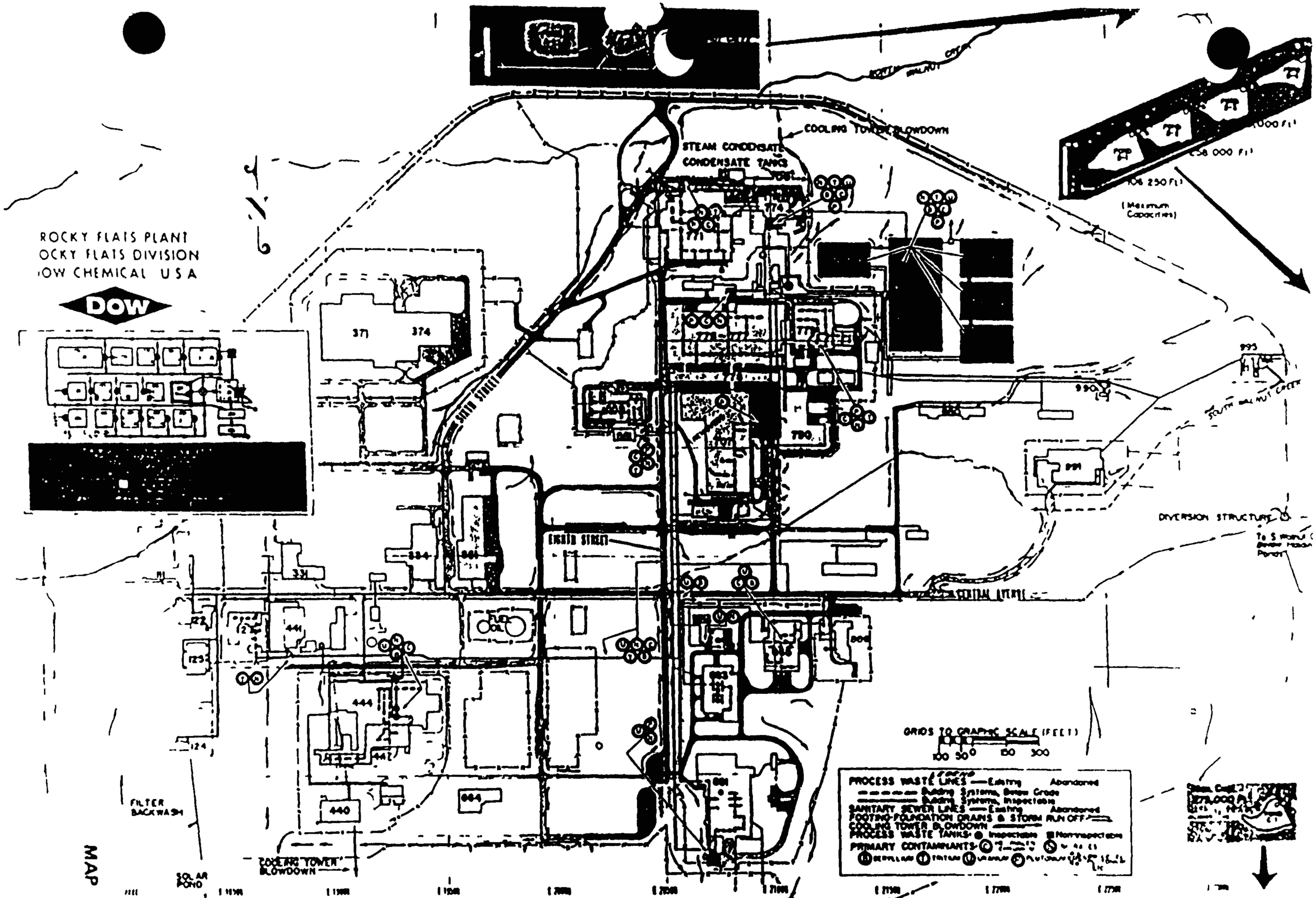
With the exception of Building 559 and between Buildings 776 and 774 as noted below, no radioactive infiltration has been detected outside the lines even in the vicinity of the leaks, but some chemical infiltration, particularly nitrate solutions, is probable. These areas are noted as "areas of concern" on Map 14A primarily in the interests of conservatism. As pipelines have been replaced, soils and liquids have been monitored and, with the noted exceptions, have not resulted in detectable concentrations. However, extremely low-level radioactive and chemical infiltration must be presumed.

Process waste lines between Buildings 776-777, 779, and 774 and between Buildings 771 and 774 have broken and leaked several times. Valve leakage has occurred in the valve pit near waste storage tank 207. Although noted incidents in this area have resulted in clean up (soil removal), residual infiltration is a surety. Thus the entire area from Buildings 776-777 and 779 Complex to Building 774 should be considered an area of concern as shown on Map 14B.

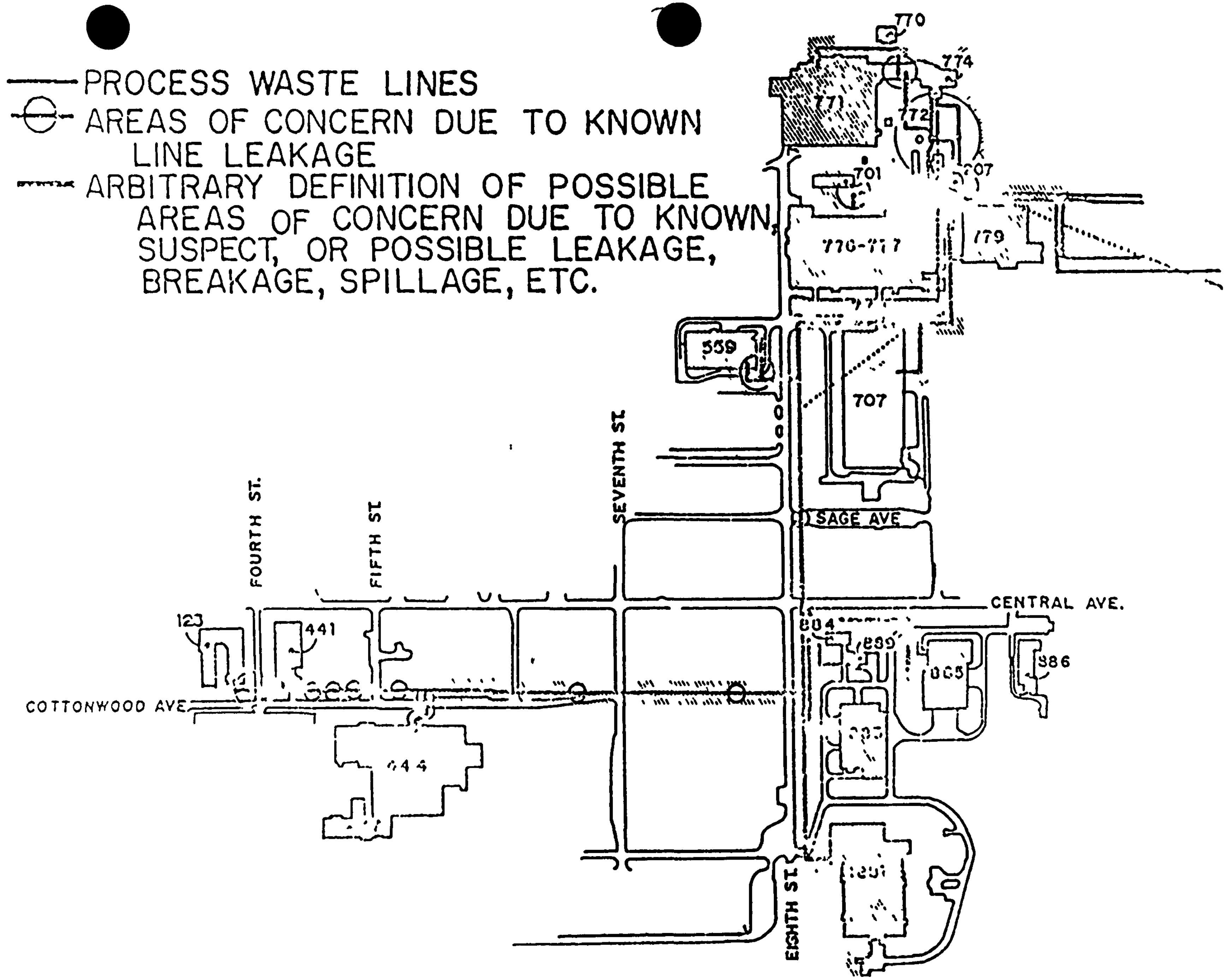
Building 559, a Service Laboratory Facility commissioned in 1968, was originally built with Pyrex® glass waste lines. Less than one year later, a break was discovered in the line from the building to the pump house. Several hundred square feet of infiltrated soil was removed as radioactive waste as a result of the leakage. This same type of line is buried beneath Building 559. In 1972, the south half of this two section line was discovered to be leaking. A PVC pipe bypass was installed. Vertical core sections taken under the building confirm some infiltration directly under the pipeline (approximately 250 dpm/g). Core samples taken outside the building, however, did not detect measurable quantities, indicating that any infiltration is contained beneath the building proper.

The remaining waste lines in Building 559 were static-leak tested following the bypass installation. Current plans call for yearly static-test to prevent recurrence.

Abandoned process waste lines under Building 707 (removed), under the new Filter Plenum for Building 779 (removed), and at the original outfall near Building 990 (still in place) as well as smaller sections elsewhere (i.e., west of Building 771) should be noted. Although not considered as sources for further contributions, some soil has been infiltrated in the immediate vicinity of the lines or original locations.

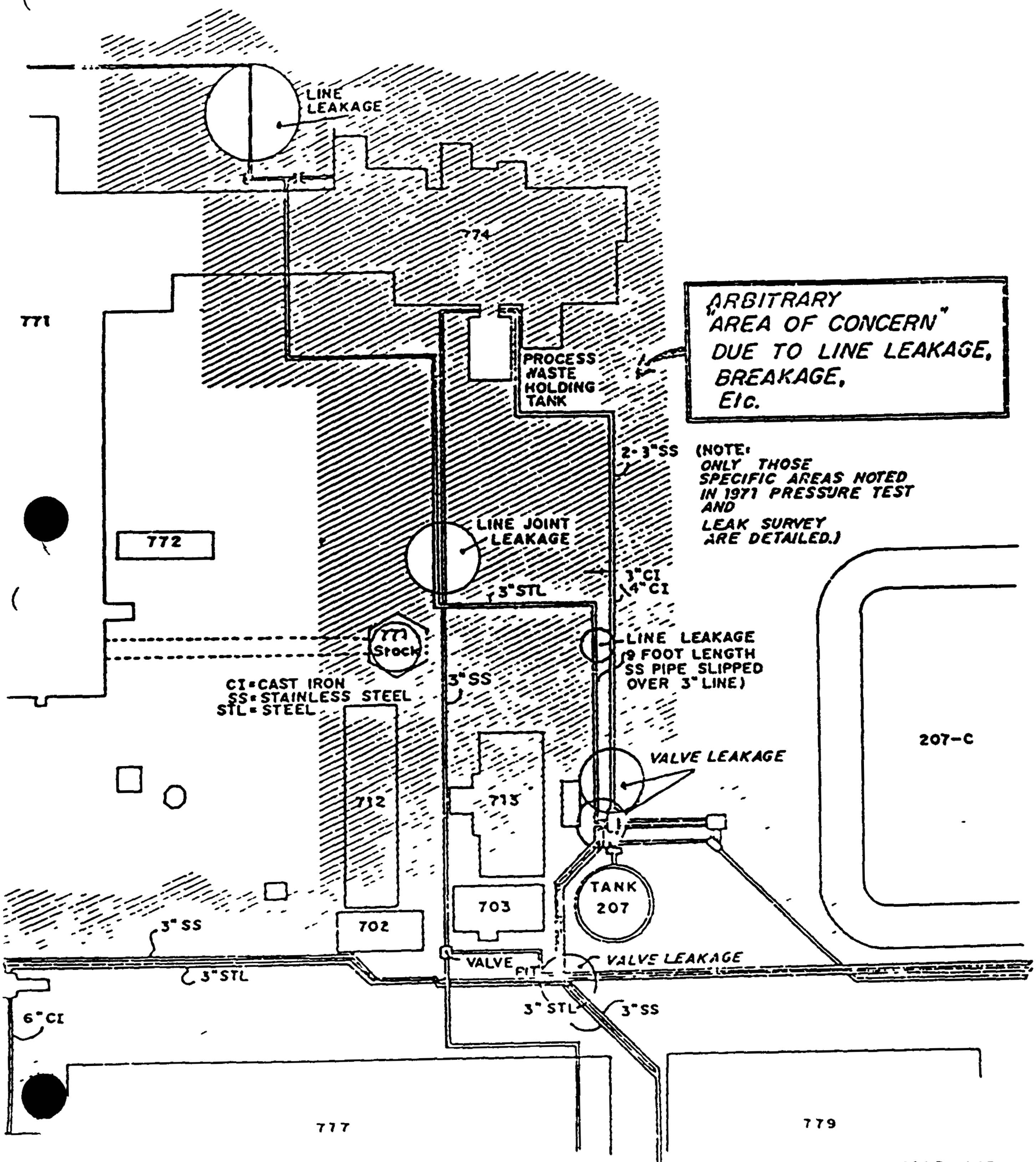

ROCKY FLATS PLANT
OCKY FLATS DIVISION
OW CHEMICAL U S A
DOW
STEAM CONDENSATE
CONDENSATE TANKS
COOLING TOWER BLOWDOWN
(Maximum Capacities)
106 250 Ft
58 000 Ft
371
374
771
774
776
777
790
SIXTH STREET
EIGHTH STREET
CENTRAL AVENUE
FUEL OIL
881
334
331
441
444
442
440
664
122
123
124
881
883
886
995
990
991
SOUTH WALNUT CREEK
DIVERSION STRUCTURE
FILTER BACKWASH
SOLAR POND
COOLING TOWER BLOWDOWN
GRIDS TO GRAPHIC SCALE (FEET)
100 50 0 150 300
LEGEND
PROCESS WASTE LINES — Existing Abandoned
Building Systems, Below Grade
Building Systems, Inspectable
SANITARY SEWER LINES — Existing Abandoned
FOOTING-FOUNDATION DRAINS & STORM RUN OFF
COOLING TOWER BLOWDOWN
PROCESS WASTE TANKS — Inspectable Noninspectable
PRIMARY CONTAMINANTS

MAP 14.

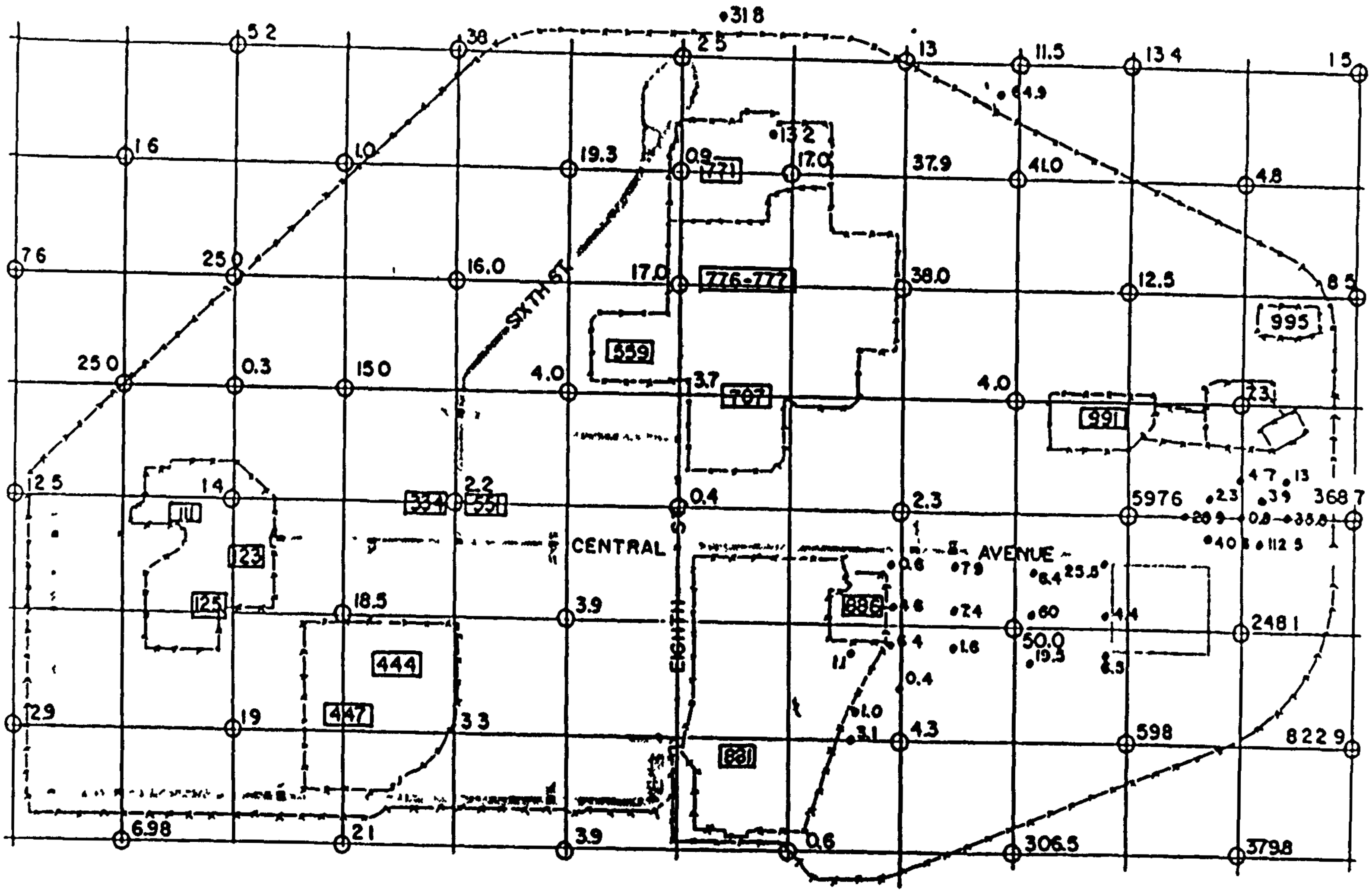


PROCESS WASTE LINES
AREAS OF CONCERN DUE TO KNOWN LINE LEAKAGE
ARBITRARY DEFINITION OF POSSIBLE AREAS OF CONCERN DUE TO KNOWN, SUSPECT, OR POSSIBLE LEAKAGE, BREAKAGE, SPILLAGE, ETC.
770
774
771
772
701
707
779
776-777
559
707
SAGE AVE
SEVENTH ST.
FOURTH ST.
FIFTH ST
CENTRAL AVE.
804
889
865
886
123
441
COTTONWOOD AVE
444
EIGHTH ST.

MAP 14A


LINE LEAKAGE
774
771
ARBITRARY "AREA OF CONCERN" DUE TO LINE LEAKAGE, BREAKAGE, Etc.
PROCESS WASTE HOLDING TANK
2-3" SS
(NOTE: ONLY THOSE SPECIFIC AREAS NOTED IN 1971 PRESSURE TEST AND LEAK SURVEY ARE DETAILED.)
772
LINE JOINT LEAKAGE
3" CI
4" CI
3" STL
LINE LEAKAGE
(9 FOOT LENGTH SS PIPE SLIPPED OVER 3" LINE)
771 Stock
3" SS
CI = CAST IRON
SS = STAINLESS STEEL
STL = STEEL
207-C
VALVE LEAKAGE
712
713
TANK 207
703
702
3" SS
VALVE
FIT
VALVE LEAKAGE
3" STL
6" CI
3" STL
3" SS
777
779

MAP 14B



ON-SITE SOIL SAMPLE RESULTS (Pu dpm/g).
ALL INDICATED VALUES=MAXIMUM OBSERVED

MAP 19.

TANK LIST

Rockwell International

by

Mr. Bob James

1988

ID No	BLDG No	CONTENTS	SIZE (gal)	MAT'L	CATH PROT	TEST/INSP DATE	INST'L DATE	APP'L REG	SWMU No	USER & EXTENSION		REMARKS 1
1	120 SE	Diesel	1,000	CS			85	RCRA I		R RINGER	4656	
2	124 S	Diesel	500	FG	NA		71	RCRA I		R RINGER	4656	
3	127 W	Diesel No 2, EG 127	550	FG	NA		78	RCRA I		R RINGER	4656	
4	381 N	Diesel, EG 374 & 371	47,500	FG			80	RCRA I		C ROSS	2539	Size & Instl date Req Verification
5	331 N 1	#2 Fuel Oil/Diesel	6,000	FG	NA		71	RCRA I		R ERWIN	2500	
6	331 N 1A	#2 Fuel Oil/Diesel	6,000	FG	NA		71	RCRA I		R ERWIN	2500	
7	331 N 2	Gasoline	6,000	FG	NA		71	RCRA I		R ERWIN	2500	OS '83, Abandoned in Place,
8	331 N 3	Unleaded Gasoline	18,000	CS			76	RCRA I		R ERWIN	2500	check volume
9	443 SE	Diesel, EG	1,500	CS			70	RCRA I		B ABBOTT	2535	
10	443 E-2	#6 Fuel Oil	20,000	CS			52	NA		B ABBOTT	2535	See Tank No 12, Not Reg UST
11	443 E 3	#6 Fuel Oil	20,000	CS			52	NA		B ABBOTT	2535	See Tank No 12, Not Reg UST
12	443 E 4	#6 Fuel Oil	20,000	CS			67	RCRA C		B ABBOTT	2535	CLOSURE PLAN FILED W/CDH 7/1/88
13	443 NE	Diesel, EG	2,133	FG	NA		76	RCRA I	157 1	B ABBOTT	2535	
14	559 NE	#2 Fuel Oil, EG 559	1,000	CS			67	RCRA I		B PHIPPS	2363	
15	562 E	#2 Fuel Oil/Diesel	3,000	CS			75	RCRA I	159	B PHIPPS	2363	
16	709 NW	#2 Diesel,EG 709&711	4,000	CS			68	RCRA I		B PHIPPS	2363	
17	718 SE	Diesel	4,000	CS			69	RCRA I		B PHIPPS	2363	
18	727 W	#2 Diesel, EG 727	3,000	CS			75	RCRA I	150 8	J REED	2614	
19	729 ESE	#2 Diesel, EG 729	650	CS			74	RCRA I		J REED	4240	
20	771 SE	Diesel	3,000	CS			52	RCRA I	139 1	J QUAYLE	2253	OS 72, Abandoned in Place, May
21	771 S	Diesel, EG 715	5,260	FG	NA		73	RCRA I		J QUAYLE	2253	
22	776 N	#2 Fuel Oil/Diesel	1,000	CS			85	RCRA I	118 1	J REED	2614	Verify volume
23	776 NW	Diesel	500	CS			68	NA	118 1	J REED	2614	Above Ground Tank
24	779 NE	#2 Diesel, EG 779	500	CS			75	RCRA I		J REED	2614	
25	827 S	#2 Diesel, EG 827	2,000	CS			71	RCRA I		J LYONS		
26	881 A NE	#2 Fuel Oil	1,000	CS			56	NA		J LYONS		OS 76, Removed & disposed
27	881 S	Diesel	2,100	CS			56	NA	yes	J LYONS		Drawings Con't 37004 X54, 200
28	881 S 1A	#6 Fuel Oil	21,000	CS			56	NA	yes	J LYONS		Drawings Con't 37004 X54, 200
29	881 S 2A	#6 Fuel Oil	21,000	CS			56	NA	yes	J LYONS		Drawings Con't 37004 X54, 200
30	881 S 3A	#6 Fuel Oil	21,000	CS			56	NA	yes	J LYONS		Drawings Con't 37004 X54, 200
31	883 N	#2 Fuel Oil/Diesel	500	CS			58	NA		J LYONS		OS 79

ID No	BLDG No	CONTENTS	REMARKS 2	REMARKS 3	PENDING ACTION	DRAWINGS
1	120 SE	Diesel			Tank Thtnesss Test & Est	37184 026
2	124 S	Diesel			Tank Thtnesss Test & Est	
3	127 W	Diesel No 2, EG 127	Records @ 124&130		Tank Thtnesss Test & Est	25741 6, D02
4	381 N	Diesel, EG 374 & 371	Records @ 124&130		Tank Thtnesss Test & Est	25001 117
5	331 N 1	#2 Fuel Oil/Diesel			Tank Thtnesss Test & Est	24974 3, 8, 6,28134 01
6	331 N 1A	#2 Fuel Oil/Diesel			Tank Thtnesss Test & Est	24974 3, 8, 6,28134 01
7	331 N 2	Gasoline	Emptied, Inventory records 331		EA During Removal	24974 3, 8, 6
8	331 N 3	Unleaded Gasoline	Salvaged Propane Tank ??		Tank Thtnesss Test & Est	24974 3,28134 01,-D01, 02, 03
9	443 SE	Diesel, EG	Loc So of Door 3T, Bldg 443		Tank Thtnesss Test & Est	20555 76, 77
10	443 E 2	#6 Fuel Oil	Heating Oil	Planned removal 1991 92	Delete fm Sub I List	14262 3
11	443 E 3	#6 Fuel Oil	Heating Oil	Planned removal 1991-92	Delete fm Sub I List	14262-3
12	443 E 4	#6 Fuel Oil	Contents Compressor Oils and Solve	entire area, plan submit 7/1/88	Delete fm Sub I List	14262 3
13	443 NE	Diesel, EG			Tank Thtnesss Test & Est	28082 1, 2,27058 6,28081-2,28080 1
14	559 NE	#2 Fuel Oil, EG 559	Inventory records Exist		Tank Thtnesss Test & Est	
15	562 E	#2 Fuel Oil/Diesel	Inven Recds Exist		Tank Thtnesss Test & Est	23450 203, 205,25608 1,23451-201
16	709 NW	#2 Diesel,EG 709&711	Inv Rcds Exist		Tank Thtnesss Test & Est	RF BZ 20221 04,20221 09
17	718 SE	Diesel	Verify Existance????????		Investigation by FE	
18	727 W	#2 Diesel, EG 727	Inven Recds Exist		Tank Thtnesss Test & Est	23470 405,23471-405
19	729 ESE	#2 Diesel, EG 729	Inv Recds Avail		Tank Thtnesss Test & Est	19675 4,19675-22
20	771 SE	Diesel	Contain Waste Product!!!	*** EXPEDITE REMOVAL ***	EA During Removal	1-13295 71
21	771 S	Diesel, EG 715	Inven Rcds Exist		Tank Thtnesss Test & Est	25486 001,25483 003
22	776 N	#2 Fuel Oil/Diesel	Site Insp by FE	FBU Fuel Supply, check w/ PWE Sub C	Tank Thtnesss Test & Est	28165 027,37515 10
23	776 NW	Diesel		FBU Fuel Supply	Delete fm Sub I List	
24	779 NE	#2 Diesel, EG 779	Inv Recds Avail		Tank Thtnesss Test & Est	E 14019 5
25	827 S	#2 Diesel, EG 827	Inven Rcds Avail		Tank Thtnesss Test & Est	21154 06
26	881 A NE	#2 Fuel Oil			Delete fm Sub I List	28084 1
27	881 S	Diesel	Filled w/ Conc, 1977		Delete fm Sub I List	28086 1, 2,37004 251,-202,
28	881 S 1A	#6 Fuel Oil	Filled w/ Conc, 1977		Delete fm Sub I List	28086 1, 2,37004 251, 202,
29	881 S-2A	#6 Fuel Oil	Filled w/ Conc, 1977		Delete fm Sub I List	28086 1, 2,37004 251, 202,
30	881 S-3A	#6 Fuel Oil	Filled w/ Conc, 1977		Delete fm Sub I List	28086 1, 2,37004 251, 202,
31	883 N	#2 Fuel Oil/Diesel	Filled w/Sand 1979		Delete fm Sub I List	25673 1

ID No	BLDG No	CONTENTS	SIZE (gal)	MAT'L	CATH PROT	TEST/INSP DATE	INST'L DATE	APP'L REG	SWMU No	USER & EXTENSION	REMARKS 1
32	920 NW	Diesel, EG 920	1,000	CS			85	RCRA I		R RINGER 4656	
33	989 E	Diesel, EG989	3,000	CS			73	RCRA I	173	R RINGER 4656	Previously listed as 898, typo
34	371 FW1	Firewater(Clean w/N)	3,000	CS			76	Non RCRA		C ROSS 2439	Room 2011 near column V6
35	371 FW2	Firewater(Clean w/N)	3,000	CS			76	Non-RCRA		C ROSS 2539	Room 2307
36	429 1	Plenum Deluge	3,000	Conc	NA		53	RCRA C			OS 6/82 PER W EDWARDS as proc
37	561 FW	Empty	3,000	SS	NA		73	NON RCRA	159	A SEMPREBON 2220	Free standing non UST
38	728 1	Plenum Deluge	25,000	Conc	NA		53	RCRA C	150 1	J QUAYLE 2253	OS as UST 9/84
39	728 2	Plenum Deluge	25,000	Conc	NA		53	RCRA C	150 1	J QUAYLE 2253	OS as UST 9/84
40	730 1	Plenum Deluge	22,500	Conc	NA		56	RCRA C	118 1	J REED 2614	Drawings Con't 28714 X11
41	730 2	Plenum Deluge	22,500	Conc	NA		56	RCRA C	118 1	J REED 2614	Drawings Con't 28714 X11
42	730 3	Radionuclides	4,500	Conc	NA		56	RCRA C	139 1	J REED 2614	Drawings Con't 28714 X11
43	730 4	Radionuclides	4,500	Conc	NA		56	RCRA C	139 1	J REED 2614	Drawings Con't 28714-X11
44	730 CT	Carbon Tetrachloride	5,000	CS			53	NA	118 1	J REED 2614	OS as UST '81
45	731 1	Double Containment	2,000	Conc	NA		60	RCRA C		J GEORGE 2330	OS as UST 7/82
46	731 2	Double Containment	2,000	Conc	NA		60	RCRA C		J GEORGE 2330	OS as UST 7/82
47	731 FW	Firewater	1,300	SS	NA		79	NA		J GEORGE 2330	Free standing non UST
48	771 C	Floor Drain Sump Rad	500	SS	NA		68	RCRA I		J QUAYLE 2253	OS 84, aka T 36
49	771 FW	Plenum Deluge	3,000	CS			72	NA		J QUAYLE 2253	Free standing non UST
50	774	Radionuclides	30,000	Conc	NA		53	RCRA C		J GONZALES	Gravel Filled w/ Conc Cap, 7/82
51	774 T 66	Radionuclides	12,550	Conc	NA		52	RCRA C		J REED 2614	aka T40
52	774 T 67	Radionuclides	12,550	Conc	NA		52	RCRA C		J REED 2614	aka T66
53	774 T 68	Radionuclides	30,850	Conc	NA		57	RCRA C		J REED 2614	aka T67
54	774 T 40	Radionuclides	7,200	Conc	NA		52	RCRA C		J REED 2614	aka T68
55	776 FW	Firewater	3,000	FG	NA		71	NA			Free standing non UST
56	782 FW	Firewater	3,000	SS	NA		73	NA	150 8	J REED 2614	Free standing non UST
57	828 1	Radionuclides	250	CS			64	RCRA C	164 2		Abandoned 1978, aka T-21
58	828 2	Radionuclides	250	CS			64	RCRA I	164 2		OS 78, VERIFY MAT'L
59	865 1	Radionuclides	3,000	Conc	NA		70	NA		J NORRIS 4467	OS 5/82, closure pre 84
60	865 2	Radionuclides	3,000	Conc	NA		70	NA		J NORRIS 4467	OS 5/82, closure pre 84
61	875 FW	Plenum Deluge	3,000	SS	NA		72	NA		R ROTH 2989	Free standing non UST
62	889 W1	Radionuclides	1,000	Conc	NA		66	RCRA C		L CHAVEZ 2421	OS 5/83, aka T 28

ID No	BLDG No	CONTENTS	REMARKS 2	REMARKS 3	PENDING ACTION	DRAWINGS
32	920 NW	Diesel, EG 920	Inven Rcds Avail		Tank Thtnesss Test & Est	37178 021
33	989 E	Diesel, EG989	Inv Rcds Avail		Tank Thtnesss Test & Est	23495 402,23490 401,23491 401
34	371 FW1	Firewater(Clean w/N)			Delete fm Sub I List	25155 305
35	371 FW2	Firewater(Clean w/N)			Delete fm Sub I List	25155 305
36	429 1	Plenum Deluge	Waste Line, aka T 2	Unable To Locate	Investigation by FE	
37	561 FW	Empty			Delete fm Sub I List	23450 204,23451 202
38	728 1	Plenum Deluge		aka T-8	Delete fm Sub I List	23815 2
39	728 2	Plenum Deluge		aka T-8	Delete fm Sub I List	23815 2
40	730 1	Plenum Deluge	OS as UST 12/82, aka T 9	Currently under RCRA Closure	Delete fm Sub I List	27830 D16,25847 3,28714 401,
41	730 2	Plenum Deluge	OS as UST 12/82, aka T 9	Currently under RCRA Closure	Delete fm Sub I List	27830 D16,25847 3,28714 401,
42	730 3	Radionuclides	OS as UST 12/82, aka T 10	Currently under RCRA Closure	Delete fm Sub I List	27830 D16,25847 3,28714-401,
43	730 4	Radionuclides	OS as UST 12/82, aka T-10	Currently under RCRA Closure	Delete fm Sub I List	27830 D16,25847 3,28714-401,
44	730 CT	Carbon Tetrachloride	Removed pre 11/4/84		Delete fm Sub I List	
45	731 1	Double Containment	aka T-11		Delete fm Sub I List	27097-1,27367 4, 6, 13, 1,23815 1
46	731 2	Double Containment	aka T 11		Delete fm Sub I List	27097 1,27367 4, 6,-13,-1,23815 1
47	731 FW	Firewater			Delete fm Sub I List	
48	771 C	Floor Drain Sump Rad	Old Process Waste Tank Currently	under RCRA Closure	Investigation by FE	
49	771 FW	Plenum Deluge			Delete fm Sub I List	26629 2,25958 002,-04
50	774	Radionuclides	Removed Pre 11/4/84	aka T-14	Delete fm Sub I List	26629 1,RF 74 654 E,RF 74S4 B
51	774 T 66	Radionuclides	RCRA C, Replacement design in	progress, S Sisk	Delete fm Sub I List	
52	774 T 67	Radionuclides	RCRA C, Replacement design in	progress, S Sisk	Delete fm Sub I List	
53	774 T 68	Radionuclides	RCRA C, Replacement design in	progress, S Sisk	Delete fm Sub I List	
54	774 T 40	Radionuclides	RCRA C, Replacement design in	progress, S Sisk	Delete fm Sub I List	
55	776 FW	Firewater	verify volume	aka T76	Delete fm Sub I List	25846 1S, 13S
56	782 FW	Firewater			Delete fm Sub I List	23474 302,23470 304,23471 301
57	828 1	Radionuclides	Old Process Waste Tank Currently	under RCRA Closure	Delete fm Sub I List	23484 303,23480 301
58	828 2	Radionuclides	Removed from Ground?????	chk drw maybe 2 tanks see RCRA PtB	Investigation by FE	23484 303,23480 301
59	865 1	Radionuclides	Converted to occupied space	aka T23, under RCRA Closure	Delete fm Sub I List	26377 4,26378 3, X01,21151 04, 14
60	865 2	Radionuclides	Converted to occupied space	aka T23, under RCRA Closure	Delete fm Sub I List	26377 4,26378 3, X01,21151 04, 14
61	875 FW	Plenum Deluge			Delete fm Sub I List	23484-302
62	889 W1	Radionuclides	Old Process Waste Tank Currently	under RCRA Closure	Delete fm Sub I List	26378 4

ID No	BLDG No	CONTENTS	SIZE (gal)	MAT'L	CATH PROT	TEST/INSP DATE	INST'L DATE	APP'L REG	SWMU No	USER & EXTENSION	REMARKS 1
63	889 W2	Radionuclides	1,000	Conc	NA		66	RCRA C		L CHAVEZ 2421	OS 5/83, aka T 28
64	985 FW	Plenum Deluge	3,000	SS	NA		73	NA	173	J REED 2614	Free standing non-UST
65	443 E 1	No 6 fuel oil	20,000	CS			66	RCRA C		B Abbott 2535	See Tank No 12, Not Reg UST
66	881 SE	No 2 Diesel, EG 881	5,000				86	RCRA I		J Lyons	
67	111 E	GASOLINE						RCRA I			Removed 78, not reported as UST
68	331 S1	Fuel Oil						RCRA I			Removed 76, not reported as UST
69	331 S2	Fuel Oil						RCRA I			Removed 76, not reported as UST
70	771 S2	No 6 Fuel Oil						RCRA I			Removed 85, Not repoeted as UST
71	771 S3	No 6 Fuel Oil						RCRA I			Removed 85, Not repoeted as UST
72	771 S4	No 6 Fuel Oil						RCRA I			Removed 85, Not repoeted as UST
73	776 S	No 2 Fuel Oil						RCRA I			Removed 85, Not repoeted as UST
74	778 N	Diesel						RCRA I			Removed 85, Not repoeted as UST
75	991 SE	Fuel Oil						RCRA I			Removed 86, Not reported as UST
76	776							RCRA I			next to tank no 22
77	122 T1		800	SS			55	RCRA C			Removed Jan 84
78	441 T3		3,000	Conc			52	RCRA C			
79	444 T4,1			Conc			62	RCRA C			
80	444 T4,2			Conc			62	RCRA C			
81	444 T5,1		4,000	STL			52	RCRA C			
82	444 T5,2		4,000	STL			52	RCRA C			
83	444 T5,3		4,000	STL			52	RCRA C			
84	444 T5,4		4,000	STL			52	RCRA C			
85	444 T5,5		4,000	STL			52	RCRA C			
86	444 T6,1		400	Conc			52	RCRA C			
87	444 T6,2		400	Conc			52	RCRA C			
88	528 T7			Conc				RCRA C			
89	771 T12,1		20,000	Conc			52	RCRA C			
90	771 T12,2		20,000	Conc			52	RCRA C			
91	774 T13		600	Conc			52	RCRA C			
92	774 T15,1		3,750	Conc			69	RCRA C			Removed 1970
93	774 T15,2		3,750	Conc			69	RCRA C			Removed 1970

ID No	BLDG No	CONTENTS	REMARKS 2	REMARKS 3	PENDING ACTION	DRAWINGS
63	889 W2	Radionuclides	Old Process Waste Tank Currently	under RCRA Closure	Delete fm Sub I List	26378 4
64	985 FW	Plenum Deluge			Delete fm Sub I List	23490 302
65	443 E 1	No 6 fuel oil	Heating Oil	Planned removal 1991 92	Delete fm Sub I List	14262 3
66	881 SE	No 2 Diesel, EG 881	****REPORT TO CDH***		Tank Thtnesss Test & Est	37004 251, 202, 209, 550, 551
67	111 E	GASOLINE			No Action	
68	331 S1	Fuel Oil			No Action	
69	331 S2	Fuel Oil			No Action	
70	771 S2	No 6 Fuel Oil	Possible Space Heat	Report to CDH & EA Unless Sp Heat	Investigation by FE	
71	771 S3	No 6 Fuel Oil	Possible Space Heat	Report to CDH & EA Unless Sp Heat	Investigation by FE	
72	771 S4	No 6 Fuel Oil	Possible Space Heat	Report to CDH & EA Unless Sp Heat	Investigation by FE	
73	776 S	No 2 Fuel Oil	Possible Space Heat	Report to CDH & EA Unless Sp Heat	Investigation by FE	
74	778 N	Diesel	****REPORT TO CDH****		EA	
75	991 SE	Fuel Oil	Possible Space Heat	Report to CDH & EA Unless Sp Heat	Investigation by FE	
76	776		per Jim Luter		Investigation by FE	
77	122 T1		Curr under RCRA Closure		No Action	
78	441 T3		Old Process Waste Tank Currently	under RCRA Closure	No Action	
79	444 T4,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
80	444 T4,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
81	444 T5,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
82	444 T5,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
83	444 T5,3		Old Process Waste Tank Currently	under RCRA Closure	No Action	
84	444 T5,4		Old Process Waste Tank Currently	under RCRA Closure	No Action	
85	444 T5,5		Old Process Waste Tank Currently	under RCRA Closure	No Action	
86	444 T6,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
87	444 T6,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
88	528 T7		Old Process Waste Tank Currently	under RCRA Closure	No Action	
89	771 T12,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
90	771 T12,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
91	774 T13		Old Process Waste Tank Currently	under RCRA Closure	No Action	
92	774 T15,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
93	774 T15,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	

ID No	BLDG No	CONTENTS	SIZE (gal)	MAT'L	CATH PROT	TEST/INSP DATE	INST'L DATE	APP'L REG	SWMU No	USER & EXTENSION	REMARKS 1
94	774	T16,1	14,000	Conc			52	RCRA C			Abandoned 1970
95	774	T16,2	14,000	Conc			52	RCRA C			Abandoned 1970
96	774	T17,1	7,500	Conc			69	RCRA C			Removed 1970
97	774	T17,2	7,500	Conc			69	RCRA C			Removed 1970
98	774	T17,3	7,500	Conc			69	RCRA C			Removed 1970
99	774	T17,4	7,500	Conc			69	RCRA C			Removed 1970
100	778	T18		Conc				RCRA C			Removed Oct '82
101	779	T19,1	1,000	Conc			64	RCRA C			Decon & Converted to non UST 12/82
102	779	T19,2	1,000	Conc			64	RCRA C			Decon & Converted to non UST 12/82
103	779	T20,1	8,000	Conc			64	RCRA C			Decon & Converted to non UST 12/82
104	779	T20,2	8,000	Conc			64	RCRA C			Decon & Converted to non-UST 12/82
105	887	T24,1	2,700	SS			52	RCRA C			Decon & Converted to new sys 12/80
106	887	T24,2	2,700	SS			52	RCRA C			Decon & Converted to new sys 12/80
107	887	T24,3	2,700	SS			52	RCRA C			Decon & Converted to new sys 12/80
108	887	T24,4	2,700	SS			52	RCRA C			Decon & Converted to new sys 12/80
109	887	T24,5	2,700	SS			52	RCRA C			Decon & Converted to new sys 12/80
110	887	T24,6	2,700	SS			52	RCRA C			Decon & Converted to new sys 12/80
111	887	T24,7	2,700	SS			52	RCRA C			Decon & Converted to new sys 12/80
112	883	T25,1	750	STL			52	RCRA C			Converted to new sys 8/84
113	883	T25,2	750	STL			52	RCRA C			Converted to new sys 8/84
114	883	T26,1	1,000	STL			66	RCRA C			Converted to new sys 8/84
115	883	T26,2	1,000	STL			66	RCRA C			Converted to new sys 8/84
116	883	T26,3	1,000	STL			66	RCRA C			Converted to new sys 8/84
117	886	T27	300	STL				RCRA C			Abandoned 1978
118	207	T29	200,000	STL			50	RCRA C			
119	731	T30		Conc				RCRA C			Cannot Locate in Field
120	990	T31		STL				RCRA C			Currently in use process waste sys
121	887	T32		Conc				RCRA C			Converted to new WP Sys, 12/80
122	561	T33	5,000	SS				RCRA C			Removed 7/82
123	561	T34,1	5,000	SS			69	RCRA C			Converted to new WP Sys, 7/82
124	561	T34,2	5,000	SS			69	RCRA C			Converted to new WP Sys, 7/82

ID No	BLDG No	CONTENTS	REMARKS 2	REMARKS 3	PENDING ACTION	DRAWINGS
94	774 T16,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
95	774 T16,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
96	774 T17,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
97	774 T17,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
98	774 T17,3		Old Process Waste Tank Currently	under RCRA Closure	No Action	
99	774 T17,4		Old Process Waste Tank Currently	under RCRA Closure	No Action	
100	778 T18		Old Process Waste Tank Currently	under RCRA Closure	No Action	
101	779 T19,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
102	779 T19,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
103	779 T20,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
104	779 T20,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
105	887 T24,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
106	887 T24,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
107	887 T24,3		Old Process Waste Tank Currently	under RCRA Closure	No Action	
108	887 T24,4		Old Process Waste Tank Currently	under RCRA Closure	No Action	
109	887 T24,5		Old Process Waste Tank Currently	under RCRA Closure	No Action	
110	887 T24,6		Old Process Waste Tank Currently	under RCRA Closure	No Action	
111	887 T24,7		Old Process Waste Tank Currently	under RCRA Closure	No Action	
112	883 T25,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
113	883 T25,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
114	883 T26,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
115	883 T26,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
116	883 T26,3		Old Process Waste Tank Currently	under RCRA Closure	No Action	
117	886 T27		Old Process Waste Tank Currently	under RCRA Closure	No Action	
118	207 T29		Old Process Waste Tank Currently	under RCRA Closure	No Action	
119	731 T30		Old Process Waste Tank Currently	under RCRA Closure	No Action	
120	990 T31		Old Process Waste Tank Currently	under RCRA Closure	No Action	
121	887 T32		Old Process Waste Tank Currently	under RCRA Closure	No Action	
122	561 T33		Old Process Waste Tank Currently	under RCRA Closure	No Action	
123	561 T34,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
124	561 T34,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	

ID No	BLDG No	CONTENTS	SIZE (gal)	MAT'L	CATH PROT	TEST/INSP DATE	INST'L DATE	APP'L REG	SWMU No	USER & EXTENSION	REMARKS 1
125	561 T35			Conc			69	RCRA C			Ababdoned 7/82
126	771 T37			Conc				RCRA C			Cannot locate in field
127	779 T38		1,000	Conc				RCRA C			Converted to new sys '82
128	881 T39,1		250	SS			52	RCRA C			Abandon date unk, Loc in Rm 114A
129	881 T39,2		250	SS			52	RCRA C			Abandon date unk, Loc in Rm 114A
130	881 T39,3		250	SS			52	RCRA C			Abandon date unk, Loc in Rm 114A
131	881 T39,4		250	SS			52	RCRA C			Abandon date unk, Loc in Rm 114A

the Rocky Mountain Arsenal in the 1960s and possible surface rupture on the Golden Fault approximately 600,000 years ago (Kirkham and Rogers, 1981)

SECTION 4

SITE GEOLOGY

Presented below are results of the geologic site investigation conducted in the vicinity of the Original Process Waste Lines in 1986 and 1987 The section begins with detailed descriptions of surficial (Section 4 1) and bedrock (Section 4 2) geology including lithologies, thicknesses, and extent of materials

Information for these discussions was obtained from previous studies, aerial photographs, 46 monitor well boring logs, 16 shallow borings, and field mapping Plate 4-1 shows the location of all monitoring wells at the Rocky Flats Plant, and Plate 4-2 presents monitor well locations in the study area Geologic logs of all boreholes and wells in the vicinity of the Original Process Waste Lines along with well completion data sheets are located in Appendix A

It is important to note that it is not known to what depth the Original Process Waste Lines were placed They are believed to be within the surficial materials, but at this time no data are available to verify this assumption

4 1 SURFICIAL GEOLOGY

Surficial materials in the Original Process Waste Lines Area consist of the Rocky Flats Alluvium, colluvium, valley fill alluvium, disturbed ground, and artificial fill unconformably overlying bedrock (Plate 4-3) In addition, there are a few isolated exposures of claystone and sandstone bedrock located along slopes and the road cut directly east of the Perimeter Security Zone

The Plant is located on a terrace which is capped by Rocky Flats Alluvium Colluvium (slope wash) covers the hillsides of the terrace, and valley fill alluvium is present in the drainages of North and South Walnut Creeks Much of the area adjacent to the solar ponds is disturbed ground due to construction of the ponds, roads, the Perimeter Security Zone (PSZ) fence, nearby buildings, and the French drain system The area around Building 881 consists of fill material derived from the excavation of Building 881 and also from materials placed at SWMU 130 from the 1969 fire cleanup and is represented on Plate 4-3 as Qaf

4 1 1 Rocky Flats Alluvium

The Quaternary Rocky Flats Alluvium is the oldest and topographically highest alluvial deposit of the Rocky Flats Plant, it is Nebraskan in age (Scott, 1965) The Rocky Flats Alluvium occurs at an elevation of approximately 5,950 feet above mean sea level in the vicinity of the solar ponds The Rocky Flats Alluvium is a series of coalescing alluvial fans deposited by braided streams (Hurr, 1976) The erosional surface (pediment) on which the alluvium was deposited slopes gently eastward truncating the Arapahoe Formation at the Solar Evaporation Ponds

Following deposition of the Rocky Flats Alluvium, eastward flowing streams began dissecting the deposit by headward erosion and lateral planation All of the alluvium was eroded in the drainages of North and South Walnut Creeks, and the terrace on which the ponds are located remained Colluvium and valley fill alluvium were subsequently deposited along the slopes and in drainages, respectively Rocky Flats Alluvium capped the terrace at the Plant prior to Plant construction Much of the alluvium was removed and/or reworked during construction activities (Cross sections A-A', B-B', and C-C', Plate 4-4)

The reworked Rocky Flats Alluvium in the study area is described as a generally poorly sorted, unconsolidated deposit of clay, silt, sand, and gravel Colors range from light brown (5 YR 5/6) to gray brown (5 YR 3/2) with isolated horizons of olive gray (5 Y 3/2) to gray brown (5 YR 3/2) Color codes are adopted from GSA Color Chart The grain size of the quartz and granitic sand ranges from fine- to coarse-grained (3 0 Ø - 1 0 Ø on the Wentworth Scale) with no single size taking predominance Gravels range from 0 25 mm to 2 0 mm in size and are angular to subangular, indicative of materials transported short distances The deposits are mildly calcareous and weakly cemented in places Where undisturbed to the east of the Solar Evaporation Ponds, the Rocky Flats Alluvium is 8 7 feet thick (well 29-86)

4 1 2 Colluvium

Colluvial materials are present on hill slopes to the northeast and southeast of the Plant descending to North and South Walnut Creeks and along the slopes of Woman Creek (Plate 4-3) Much of the colluvium on the slope due north of the Solar Evaporation Ponds was removed during construction of the PSZ fence and the French drain system Colluvium was penetrated by wells 21-87 and 22-87 to depths of 9 5 and 12 8 feet, respectively

Colluvium is described as consisting predominantly of clay with common occurrences of sandy clay and gravel layers Colluvial clay is typically poorly consolidated and ranges in color from dark yellowish brown (10 YR 4/2) to light olive gray (5 Y 5/2) and light olive brown (5 Y 5/6) Occasional dark yellowish orange iron staining (10 YR 6/6) and stringers of brownish gray (5 YR 4/1) are present Sand, when present, is very fine-grained to coarse-grained and poorly sorted Occasional cobbles occur within gravel layers, which are poorly sorted and unconsolidated

4 1 3 Valley Fill Alluvium

The most recent alluvial deposit on Plant site is valley fill alluvium found along the drainages of North and South Walnut Creeks, and Woman Creek This alluvium is derived from reworked and redeposited older alluviums and bedrock material

Valley fill alluvium was encountered in eight wells in the study area ranging from 5 5 feet (36-86) to 16 1 feet (34-86) in thickness The unconsolidated valley fill alluvium consists of poorly sorted sand, gravel, and cobbles in a clay matrix Colors range from olive gray (5 Y 3/2) with dark yellowish orange mottles (10 YR 6/6) to dark yellowish brown (10 YR 4/2) Gravels are subangular to subrounded and unsorted Composition of the valley fill alluvium does not differ significantly between North and South Walnut Creeks based on lithologic descriptions from borings for wells 13-86, 14-86, 15-86, 16-86, and 17-86 drilled in the North Walnut Creek drainage and borings for wells 34-86, 35-86, and 36-86 drilled in the South Walnut Creek drainage

4 1 4 Disturbed Ground

Plate 4-3 shows much of the area around the Solar Evaporation Ponds and on the 881 Hillside (wells 1-87, 51-87, and 53-87, Cross Section D-D', Plate 4-4) as disturbed ground This includes the ponds, buildings, roadways, the PSZ fence, and the French drain system north of the ponds A total of 20 wells and all 16 borings were drilled though disturbed materials (Plate 4-2) Areas of disturbed ground are also shown in cross sections B-B', C-C', D-D', and E-E' on Plate 4-4

Disturbed ground is generally described as unconsolidated clay, silt, sand, gravel, and pebbles The materials are very poorlv sorted with fragments of clavstone and cement rubble and display no bedding A multitude of colors were encountered from olive to reddish brown (5 Y 5/6 - 10 R 5/4) to olive to yellow gray (5 Y 5/2 - 5 Y 8/4) and gray to yellow orange (10 YR 7/4 - 10 YR 6/6) Granitic and quartzite, angular to subangular gravels and pebbles are commonly found in areas of disturbed Rocky Flats Alluvium or disturbed colluvium Sand, when present, varied from fine- to coarse-grained and was very poorly sorted Thickness of the fill material ranges from 0 8 feet at well 32-86 (north of pond 207A) to greater than 21 feet at boring SP07-87 (east of Pond 207-B South)

4 1 5 Artificial Fill

There are two types of artificial fill on the 881 Hillside (Plate 4-2) derived from separate sources (Rockwell International, 1988) The first is fill material derived from excavation of the Building 881 foundation, and the second is soil placed at SWMU 130 from the 1969 fire cleanup

Material excavated for the Building 881 foundation was spread over a large area generally south of the building The very poorly sorted and unconsolidated artificial fill was derived from Rocky Flats Alluvium, colluvium, and claystone bedrock It is predominantly composed of sandy clay with some gravelly zones (Plate 4-4, Cross Section A-A') The fill is generally brown to gray in color with occasional zones of moderate yellowish brown staining A weakly cemented zone of caliche was encountered in well 54-87 The fill is underlain by colluvial and bedrock materials, and ranges from two to five feet in thickness (Rockwell International, 1988)

4 2 BEDROCK GEOLOGY

The Cretaceous Arapahoe Formation underlies surficial deposits in the Original Process Waste Lines Area Ten wells were completed in various zones of the bedrock during the 1986 and 1987 drilling programs The Arapahoe Formation beneath the study area consists primarily of claystone with interbedded sandstones and siltstones The Arapahoe Formation was deposited by meandering streams flowing generally west to east off the Front Range Sandstones were deposited as braided stream channel deposits and as overbank splays Claystones were deposited in back swamp and floodplain areas Leaf fossils, black organic matter, and wood fragments were encountered within the claystones during drilling near the solar ponds Contacts between various lithologies are both gradational and sharp

4 2 1 Arapahoe Claystones

Claystones were the most frequently encountered lithology of the Arapahoe Formation immediately below the Quaternary/Cretaceous contact (Cross Sections A-A' through E-E', Plate 4-4) Claystones are described as massive and blocky, containing occasional thin laminae and stringers of sands, silt, and coal

Weathered bedrock was encountered directly beneath surficial materials in all of the monitor wells and borings Weathering was noted to depths of 28 0 and 39 0 feet below ground surface in boring SP06-87 and monitor well 39-87BR, respectively The weathered claystones generally range from pale yellowish brown (10 YR 6/2) to light olive gray (5 YR 5/6) in color and are moderately stained with iron oxide Iron oxide stains also occurred as brown and red mottling Calcium carbonate deposits along with iron oxide concretions are noted in the weathered zone Fractures are noted between 6 0 and 26 0 feet below ground surface in wells 24-86, 27-86, 22-87, 29-86, 31-86, and 33-86 associated with the weathered zone Calcareous pockets and ironstone concretions were observed along these fractures

Unweathered claystone is typically dark gray (N 3/0) to yellowish gray (5 Y 7/2) and has little mottling Vertical, subvertical, horizontal, and 45 degree fractures associated with unweathered claystone are found at varying depths between approximately 30 feet (34-86) to greater than 100 feet (23-86) Fractures could not be correlated between boreholes Many of the shallower fractures (30-60 feet) are described as calcareous, limonitic, or iron stained implying water movement However, the fractures cannot be correlated between holes Both weathered and unweathered claystone contains laminae of siltstone and very fine-grained sandstone Typical siltstone and sandstone horizons range from brownish gray (5 YR 4/1) to dark yellowish orange (10 YR 6/6) in color

4 2 2 Arapahoe Formation Sandstones

Bedrock wells 14-86, 16-86, 23-86, 25-86, 27-86, 31-86, 32-86, and 39-87BR in the study area are completed in Arapahoe Formation sandstones In addition, boreholes SP01-87, SP04-87, SP11-87 and SP12-87 encountered near surface Arapahoe sandstones These sandstones are generally composed of moderately to well sorted, subrounded to rounded, very fine- to medium-grained, consolidated quartzose sand The shallower (weathered) sandstones exhibited dark yellowish orange mottling (10YR 6/6), and cementation increased with depth due to a decrease in weathering The thickness of individual sandstone layers ranged from 1 9 feet in wells 14-86 and 16-86 to a maximum of 19 8 feet in well 39-87BR Most sandstones encountered contain thin beds or laminae of silt and clay Bedding ranged from none apparent in well 32-

86 to convoluted bedding in well 23-86 Color of the sandstone ranged from light gray (N 6/6) to dark greenish gray (5 GY 4/1) in well 25-86 to olive gray (N 7/0) in well 32-86

Siltstones were also encountered in the Arapahoe Formation during the drilling programs Specifically, wells 14-86, 16-86, 23-86, and 25-86 encountered relatively homogeneous beds of unweathered siltstone These beds ranged from less than one foot (well 14-86) to 30 feet in thickness (well 23-86) They are dark gray (N 3/0) to dark greenish gray (5 GY 4/1) in color, contain a trace of very fine-grained sand, are slightly calcareous, and contain some wood fragments

As shown on cross sections A-A', B-B', and C-C' (Plate 4-4), sandstone/siltstone beds are present beneath the Original Process Waste Lines Area Some beds occur at depth and others subcrop at the Quaternary/Cretaceous boundary Cross sections A-A', B-B', and C-C' depict the siltstone and sandstone units dipping gently eastward at approximately seven degrees

Subcropping sandstones were encountered in the vicinity of the solar ponds in wells 39-87BR, 31-86, 32-86, 22-86 and borings SP01-87, SP02-87, SP11-87, and SP04-87 (Plate 4-2) Subcropping sandstones vary in thickness from less than 3 0 feet at borehole SP04-87 to approximately 20 0 feet at well 39-87BR (Cross Sections B-B' and C-C', Plate 4-4) In well 31-86, approximately 11 0 feet of sand described as soft and weakly consolidated (very weathered) underlies disturbed ground In all other cases the sandstone is consolidated and firm

The subcropping Arapahoe sandstones are generally described as a fine- to coarse-grained (3 5 - 2 5 Ø), rounded to subrounded, weakly to moderately cemented, quartz sand They occasionally contain small pebble horizons which are generally moderately to well sorted The sandstone color ranges from light gray (N 6/0) to dark gray (N 4/0) grading into yellow grav (5 Y 2/2 - 5 Y 7/2) and pale olive (10 YR 6/2) Yellow orange iron oxide staining (10 YR 6/6) is noted in several wells with the frequency of occurrence increasing toward the surface as a result of weathering

The subcropping sandstone is generally weathered, blocky, massive, and contains lignite fragments (SP11-87) and leaf imprints (32-86) Calcium carbonate and coal stringers are noted in borehole SP03-87 Fractures are noted in core from holes 32-85, 31-86, and 22-86 at depths of 5 0, 6 8, and 14 4 feet, respectively The fractures at 6 8 feet in hole 31-86 are infilled with calcareous deposits

The relative vertical and horizontal location of the subcropping sandstones and the physical descriptions of the same sandstones in the solar pond area suggest that many of the subcropping sandstones are interconnected Approximate areal extents of subcropping sandstones are shown in plan view on Plate 4-2

One occurrence of subcropping sandstone appears at well 39-87BR where approximately 20 feet of fine-grained sandstone subcrop Sandstone subcrop was not encountered in any adjacent wells

The second and third occurrences of subcropping sandstones include borehole SP04-87 where approximately 3 0 feet of sandstone is present and borehole SP11-87 where approximately 8 5 feet of subcropping sandstone underlies disturbed ground In both cases, no adjacent wells contain subcropping sandstone, suggesting that these sandstone occurrences have limited lateral extent

A fourth and extensive area of subcropping sandstone occurs in wells 31-86, 32-86, 22-86, and boreholes SP01-87 and SP02-87 Sandstone thicknesses range from 5 0 feet to 15 5 feet in boreholes SP03-87 and 32-86, respectively The combination of these five holes outlines an oblong area underlying portions of Solar Evaporation Ponds 207-A and 207-C (Plate 4-2)

Finally, during the drilling of well 9-87BR, a sandstone unit was encountered at the Quaternary/Cretaceous contact, 12 7 feet below ground surface (Cross Section E-E', Plate 4-4) The unit was found to be 18 8 feet thick and ranged from very fine-grained to coarse-grained in nature As discussed in detail in Rockwell International, 1988, the correlation between the sandstone unit found in well 9-87BR and 16-87BR which is primarily based on their similar lithologic characteristics, has set the basis for establishing a seven degree structural dip for the area

SECTION 5

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ID No	BLDG No	CONTENTS	REMARKS 2	REMARKS 3	PENDING ACTION	DRAWINGS
125	561 T35		Old Process Waste Tank Currently	under RCRA Closure	No Action	
126	771 T37		Old Process Waste Tank Currently	under RCRA Closure	Investigation by FE	
127	779 T38		Old Process Waste Tank Currently	under RCRA Closure	No Action	
128	881 T39,1		Old Process Waste Tank Currently	under RCRA Closure	No Action	
129	881 T39,2		Old Process Waste Tank Currently	under RCRA Closure	No Action	
130	881 T39,3		Old Process Waste Tank Currently	under RCRA Closure	No Action	
131	881 T39,4		Old Process Waste Tank Currently	under RCRA Closure	No Action	

APPENDIX 4

ORIGINAL PROCESS WASTE LINES
GEOLOGIC CHARACTERIZATION REPORT

ORIGINAL PROCESS WASTE LINES

GEOLOGIC CHARACTERIZATION REPORT

ROCKY FLATS PLANT

GOLDEN, COLORADO

OCTOBER 3, 1988

Prepared for

Rockwell International
Aerospace Operations
Rocky Flats Plant
Golden, Colorado 80401

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TABLE OF CONTENTS

LIST OF PLATES

LIST OF FIGURES

SECTION 1

CONCLUSIONS AND RECOMMENDATIONS

The geologic information collected from the areas in the vicinity of the Original Process Waste Lines show that the system is situated within disturbed Rocky Flats Alluvium and/or disturbed colluvial materials These overburden materials range from 0 8 to 21 feet thick and unconformably overlie Arapahoe Formation claystone or sandstone units

The geology in the northern portion of the Original Process Waste Line system is well documented due to the drilling of numerous boreholes in 1986 and 1987 to characterize the hydrogeology of the Solar Evaporation Ponds Area However, only limited data are available for the remainder of the study area In addition, ground-water flow directions are poorly defined within the Plant security fence Therefore, the following recommendations are made to characterize the hydrogeology in the vicinity of the Original Process Waste Lines

Additional borings should be drilled along the southern and western portions of the Original Process Waste Line system It is important to note that these proposed drilling locations are tentative and their exact placement will depend primarily upon each site's accessibility The Original Process Waste Lines are located within the Plant and therefore the area is densely populated with buildings, parking lots, and utility lines

Seven additional borings are proposed to characterize the geology in the Original Process Waste Lines area These borings will be drilled to

1) Determine lithology and thickness of surficial materials

2) Determine lithology of bedrock beneath the Original Process Waste Lines

3) Determine thickness of subcropping sandstone units where encountered

These borings will be augered and sampled to a depth not less than ten feet into weathered bedrock If a sandstone unit is encountered in the bedrock, the boring will extend through the entire thickness of the unit and will be terminated no less than five feet below the base of the sandstone This method will enable the geologist to complete a detailed lithologic description of the bedrock materials

Approximate locations for the proposed borehole locations are listed below

1) 800 ft west and 150 ft south of well 23-86,

2) 400 ft west and 300 ft south of well 23-86,

3) 170 ft west and 330 ft south of location No 2,

4) 1,000 ft south of location No 3,

5) 500 ft west and 180 ft south of well 61-86,

6) 500 ft west of location No 6, and

7) 1,050 ft west of location No 6

Piezometers will be installed in the vicinity of the Original Process Waste Lines to define the extent of saturation and ground-water flow directions Approximately 100 piezometers will be installed on 400 foot centers within the Plant security area Another 26 piezometers will be located immediately adjacent to the Original Process Waste Lines for site-specific water level information

Piezometers will be constructed by driving one-inch diameter PVC pipe to the anticipated top of bedrock at each location The bottom five feet of each piezometer will be screened Water levels will be monitored on a monthly basis for one year following installation to provide seasonal water level information within the Plant

Three alluvial ground-water monitor wells will also be installed adjacent to and presumably to downgradient of the Original Process Waste Lines The approximate locations for the proposed wells are as follows

1) 1,000 feet west and 40 feet south of well 10-87 (903 Pad Area),
2) 400 feet east and 350 feet south of well 44-86, and
3) 200 feet west and 400 feet south of well 23-86 (Solar Ponds Area)

These wells will be sampled quarterly as part of Interim Status ground-water monitoring for the Original Process Waste Lines Slug tests will also be performed on these wells in order to determine the hydraulic conductivity of the Rocky Flats Alluvium in the Plant area and in further characterizing the hydrogeology in the vicinity of the Original Process Waste Lines

SECTION 2

INTRODUCTION

This report presents a hydrogeologic and waste source characterization of the Original Process Waste Lines at Rocky Flats Plant The Original Process Waste Lines were first identified as a RCRA regulated unit in the summer of 1985 Subsequently, the Original Process Waste Lines were abandoned by 1985 A closure plan for the Original Process Waste Lines is required pursuant to Part 270 and 264 of the Colorado State Hazardous Waste Regulations (6 CCR) and Title 40, Part 264 of the Code of Federal Regulations (40 CFR) The goal of the closure plan is to meet closure performance standards as follows

- The owner or operator must close the facility in a manner that a) minimizes the need for further maintenance, and b) controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or to the atmosphere (6 CCR and 40 CCR 264 111)

- The owner or operator must provide a detailed description of the steps needed to remove or decontaminate all hazardous waste residues and contaminated containment system components, equipment, structures, and soils during partial and final closure including, but not limited to, procedures for cleaning equipment and removing contaminated soils, methods for sampling and testing surrounding soils, and criteria for determining the extent of decontamination necessary to satisfy the closure performance standard [6 CCR and 40 CFR 264 112 (b)(4)]

- The owner or operator must provide a detailed description of other activities necessary during partial closure period to ensure that all partial and final closure satisfy the closure performance standards, including, but not limited to, ground-water monitoring, leachate collection, and run-on and run-off control [6 CCR and 40 CFR 264 112(b)(5)]

- o During the partial and final closure periods, all contaminated equipment, structures and soil must be properly disposed of, or decontaminated unless specified otherwise in 264 197 (6 CCR and 40 CFR 264 114)

- o If the owner or operator demonstrates that not all contaminated soils can be practically removed or decontaminated as required in paragraph 264 197(a), then the owner or operator must close the tank system and perform post-closure care in accordance with the closure and post-closure care requirements that apply to landfills (264 310)

A closure plan for the Original Process Waste Lines was submitted on November 25, 1987, as part of the Post-Closure Care Permit Application (Rockwell International, 1987) Interpretations and conclusions incorporated in this document supersede those in the November 25, 1987, plan

2 1 REPORT OVERVIEW

This report provides geologic results of the 1986 and 1987 site characterization investigations performed in areas adjacent to the Original Process Waste Lines There is no characterization of ground-water flow or quality presented in this report because no monitoring wells have been installed to specifically monitor the Original Process Waste Lines Additional wells and piezometers will be installed adjacent to the Original Process Waste Line during the fall and winter of 1988

The report begins with site background information Presented in this introduction are site location and description and objectives of this study The introduction is followed by a regional setting chapter (Section 3) which describes climatology, physiography and geology in the vicinity of Rocky Flats Plant Section 4, Site Geology, discusses the surficial and bedrock geology in the vicinity of the Original Process Waste Lines Appendix A contains geologic logs and well construction summaries for the wells and boreholes in the vicinity of the Original Process Waste Lines

2 2 SITE LOCATION AND DESCRIPTION

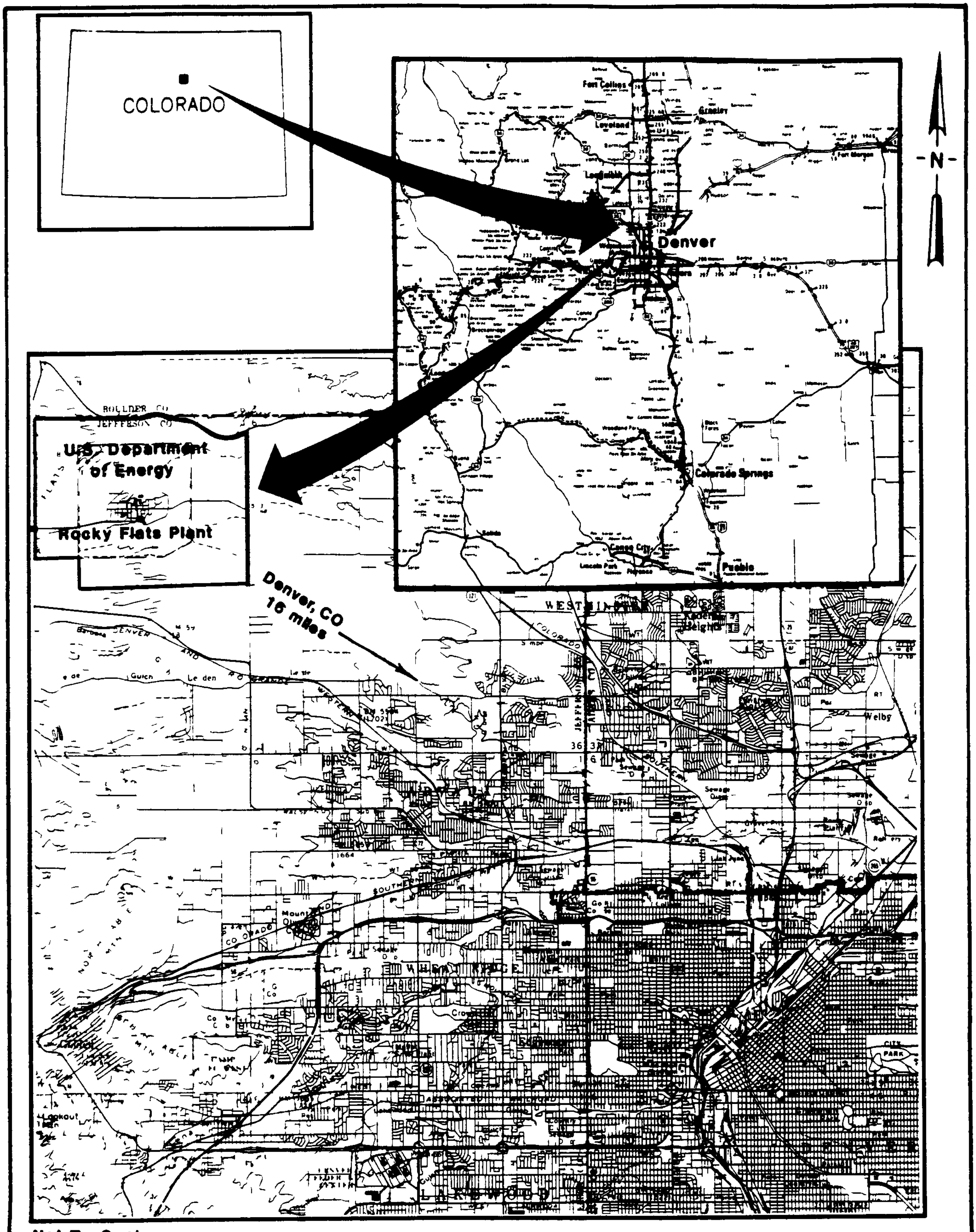
The Rocky Flats Plant is located in northern Jefferson County, Colorado, approximately 16 miles northwest of Denver (Figure 2-1) The Plant consists of approximately 6,550 acres of federally owned land in Sections 1 through 4 and 9 through 15 of T2S, R70W, 6th Principal Meridian Major buildings are located within the Plant security area of approximately 400 acres The security area is surrounded by a buffer zone of approximately 6,150 acres (Figure 2-2)

This site characterization report addresses the Original Process Waste Lines, located within the Rocky Flats Plant security fence (Figure 2-2)

2 2 1 Construction History

The following information regarding the construction history and design of the Original Process Waste Lines is based on interviews with Dow Chemical and Rockwell International employees conducted by Chen and Associates personnel In addition, previous reports and letters were reviewed

The Original Process Waste Lines consist of a system of tanks and associated lines located within the Plant security fence The system was constructed to transport and temporarily store process wastes from point of origin to on-site treatment points and was placed into operation in 1952 Additions to the system were made through 1975, and the original system has since been replaced Details of the construction



Not To Scale

Figure 2-1: Location of Rocky Flats Plant history, design, past usage, and waste treatment are located in Sections 1 2 3 and 1 2 4 of this Original Process Waste Lines Closure Plan

2 3 OBJECTIVES AND SCOPE

The objectives of this study are to characterize the site geology in the vicinity of the Original Process Waste Lines This information will support closure activities, post-closure care, and monitoring programs It is also the objective of this study to make recommendations for additional data collection as needed for characterization of the geology

It is not the intent of this study to characterize the hydrogeology and/or ground-water chemistry No site-specific program was designed for the Original Process Waste Lines, therefore, insufficient data are available for a complete characterization Data for this report have been taken from previous reports from areas adjacent to the Original Process Waste Lines (i e, 881 Hillside and Solar Pond reports) Plans for ground-water investigations in accordance with 6 CCR 1007-C Part 264 and Part 265 (40 CFR Parts 264 and 265) are presented in Section E of the Post-Closure Care Permit Application

SECTION 3

REGIONAL SETTING

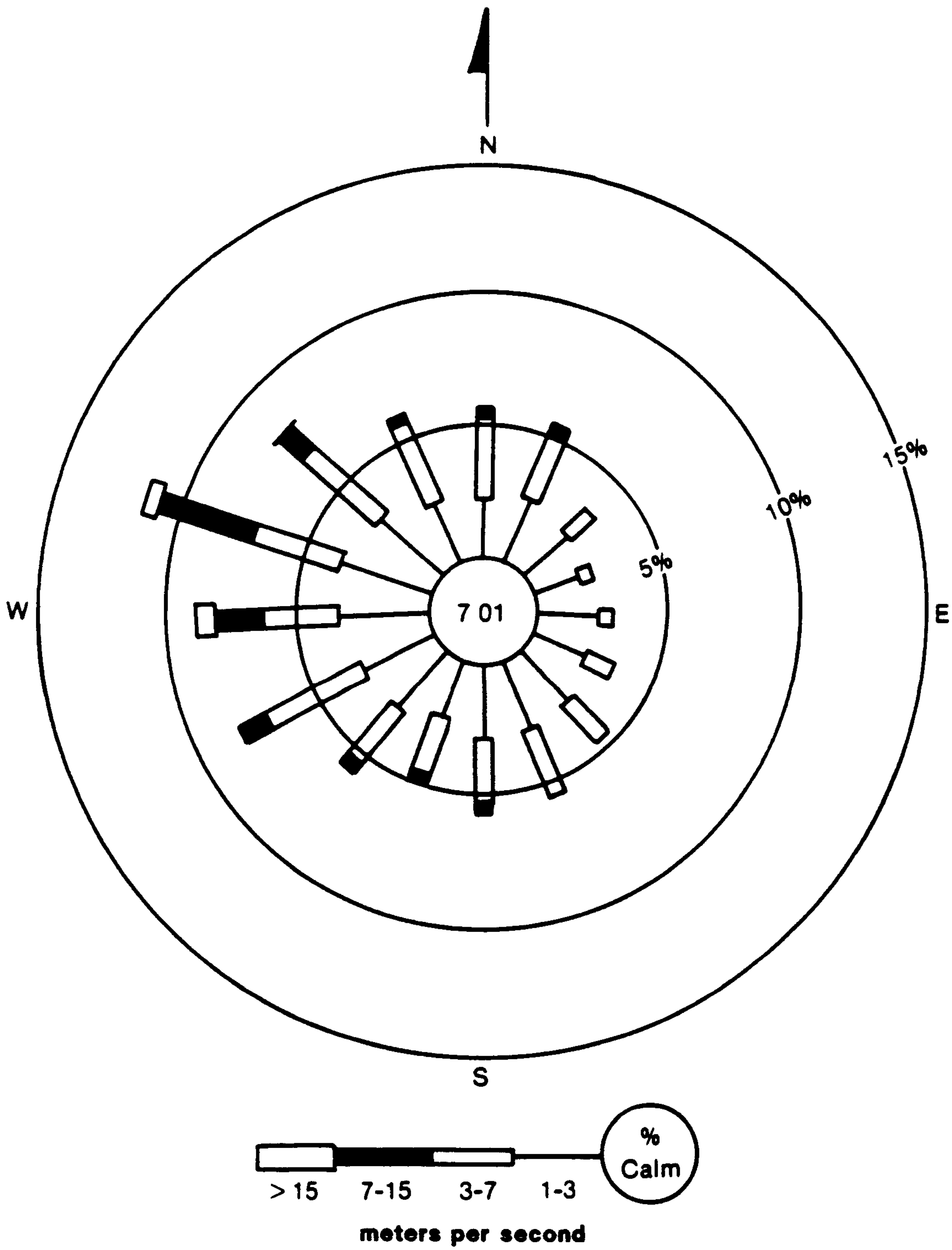
This section presents the regional setting of Rocky Flats Plant, including discussions of climatology, physiography and geology Site-specific discussions of the surficial and bedrock in the vicinity of the Original Process Waste Lines are presented in Section 4

3 1 CLIMATOLOGY

The area surrounding the Rocky Flats Plant has a semiarid climate typical of the Rocky Mountain region However, the elevation of the Plant and the nearby slopes of the Front Range slightly modify the regional climate

Winds at Rocky Flats Plant, although variable, are predominantly from the west-northwest Stronger winds occur during the winter, and the area occasionally experiences Chinook winds with gusts up to 100 miles per hour because of its location near the Front Range (DOE, 1980) Figure 3-1 shows the wind direction, frequency, and average velocity for each direction as recorded in 1985

Temperatures are moderate, extremely warm or cold weather is usually of short duration On the average, daily summer temperatures range from 55 to 85 degrees Fahrenheit (F) and winter temperatures range from 20 to 45 degrees F Temperature extremes recorded at the Plant have ranged from 102 degrees F on July 12, 1971 to -26 degrees F on January 12, 1963 The 24-year daily average maximum temperature for the period 1952 to 1976 was 76 degrees F, the daily average minimum



(after Rockwell International, 1987a)

Figure 3-1:

1986 Annual Wind Rose for the Rocky Flats Plant

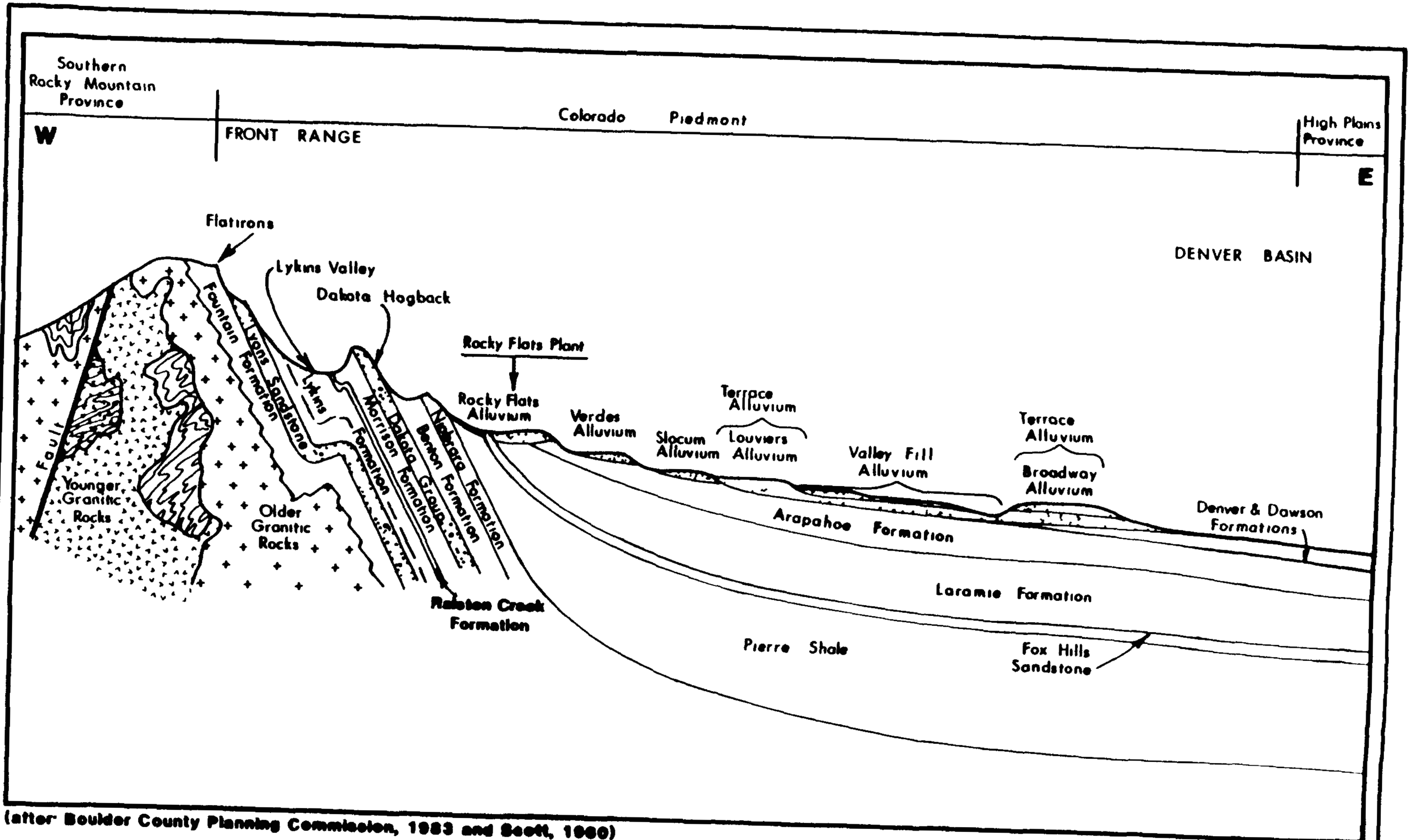
was 22 degrees F, and the average annual mean was 50 degrees F Average relative humidity was 46 percent (DOE, 1980)

Average annual precipitation at the Plant is 15 inches Approximately 40 percent of the precipitation falls during the spring season, much of it as snow Thunderstorms from June to August account for an additional 30 percent of the precipitation Autumn and winter are drier seasons, accounting for 19 and 11 percent of the annual precipitation, respectively Snowfall averages 85 inches per year, generally occurring between October and May (DOE, 1980)

3 2 PHYSIOGRAPHY

The Rocky Flats Plant is located at an elevation of approximately 6,000 feet above mean sea level The site is on the western margin of the Colorado Piedmont section of the Great Plains Physiographic Province (Fenneman, 1931) The Colorado Piedmont ranges in elevation from 4,000 feet on the east to 7,000 feet on the west The Piedmont merges to the east with the High Plains section of the Great Plains Province and is terminated abruptly on the west by the Front Range section of the Southern Rocky Mountain Province (Figure 3-2)

The Colorado Piedmont is an area of dissected topography and denudation where Tertiary strata underlying the High Plains have been almost completely removed In a regional context, the piedmont represents an old erosional surface along the eastern margin of the Rocky Mountains It is underlain by gently dipping sedimentary rocks (Paleozoic to Cenozoic in age), which are abruptly upturned at the Front Range to form hogback ridges parallel to the mountain front The piedmont surface is broadly rolling and slopes gently to the east with a topographic relief of



(after Boulder County Planning Commission, 1983 and Scott, 1960)

Not To Scale

Figure 3-2:
Generalized East-West Cross Section
Front Range to Denver Basin

only several hundred feet This relief is due both to resistant bedrock units that locally rise above the surrounding landscape and to the presence of incised stream valleys Major stream valleys which transect the piedmont from west to east have their origin in the Front Range Small local valleys have developed as tributaries to these major streams within the piedmont In the area of the Plant, a series of Quaternary pediments have been eroded across this gently rolling surface (DOE, 1980)

The eastern margin of the Front Range a few miles west of the Plant is characterized by a narrow zone of hogback ridges and flatirons formed by steeply east-dipping Mesozoic strata (such as the Dakota Sandstone and the Fountain Formation) Less resistant sedimentary units were removed by erosion (Figure 3-2) The Front Range reaches elevations of 12,000 to 14,000 feet above mean sea level 15 miles farther west The range itself is broad and underlain by resistant gneiss, schist and granitic rocks of Precambrian age The resistant nature of these rocks has restricted stream erosion so that deep, narrow canyons have developed in the Front Range

Several pediments have been eroded across both hard and soft bedrock in the area of the Plant during Quaternary time (Scott, 1963) The Rocky Flats pediment is the most extensive of these, forming a broad flat surface south of Coal Creek The broad pediments and more narrow terraces are covered by thin alluvial deposits of ancient streams draining eastward into the Great Plains The sequence of pediments reflects repetitive physical processes associated with cyclic changes in climate Each erosional surface and stratigraphic sequence deposited on it probably represents a single glacial cycle The oldest and highest pediment, the Subsummit Surface (Scott, 1960), truncates the hogback ridges of the Front Range Three successively younger pediments, veneered by alluvial gravels, extend eastward from the mountain front Erosion of valleys into the pediments followed each depositional cycle so that, near the mountain front, stratigraphically younger geologic units occur at topographically lower elevations as narrow terrace deposits along the streams From oldest to youngest, the three pre-Wisconsin deposits are the Rocky Flats Alluvium, the Verdos Alluvium and the Slocum Alluvium (Scott, 1965) A series of Wisconsin and post-Wisconsin terrace deposits are present at lower elevations along streams that have incised the older pediments (east of the Plant) These alluvial deposits are described in Section 3 3 3, Surficial Geology

The Rocky Flats Plant is located on a relatively flat surface of Rocky Flats Alluvium The pediment surface and overlying alluvium (generally 10 to 50 feet thick, although the alluvium is as much as 100 feet thick west of the Plant) have been eroded by Walnut Creek on the north and Woman Creek on the south so that terraces along these streams range in height from 50 to 150 feet The grade of the gently eastward-sloping, dissected Rocky Flats Alluvium surface varies from 0 7 percent at the Plant to approximately 2 percent just east of the Plant

3 3 REGIONAL GEOLOGY

3 3 1 Geologic and Stratigraphic History

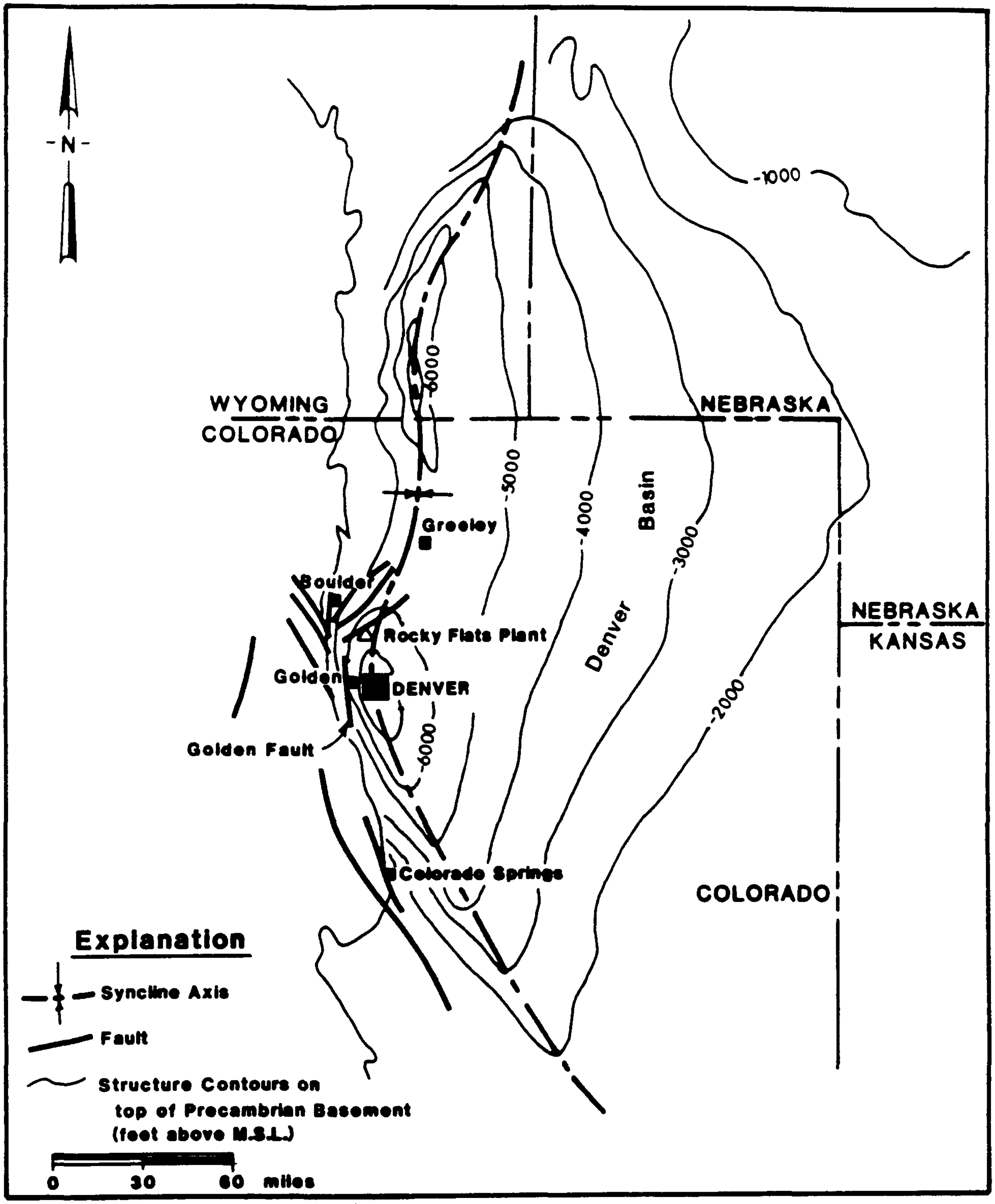
This section describes the regional geologic and stratigraphic history in the vicinity of the Plant, including the Denver Basin Section 4 describes the site specific geology and stratigraphy of the Original Process Waste Lines Area

The Rocky Flats Plant is located on the northwestern flank of the Denver Basin and is underlain by about 12,000 feet of Paleozoic and Mesozoic sedimentary rocks (Hurr, 1976) The Denver Basin is an asymmetric syncline that formed during the Late Cretaceous Laramide Orogeny The western limb of the basin dips steeply to the east, and the eastern limb dips gently to the west (Figure 3-3)

The geologic history of northeastern Colorado involves several episodes of mountain building and oceanic transgression and regression, resulting in the deposition of thousands of feet of sedimentary rock on top of the Precambrian basement This section describes the geologic history beginning with Precambrian time Geologic descriptions of the various units are provided within this context More detailed descriptions of the units present on site are provided in Section 4

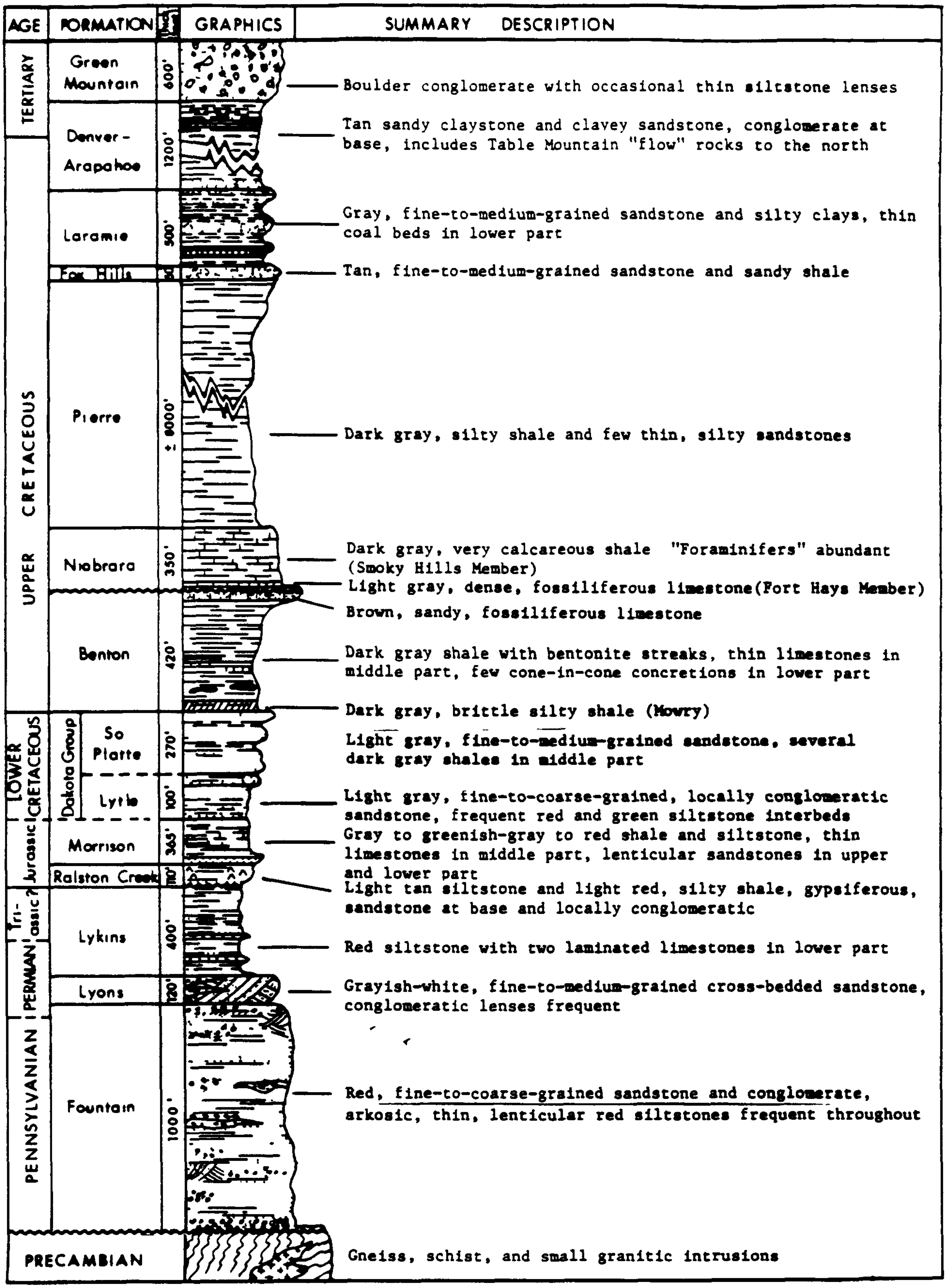
Early Precambrian tectonic, metamorphic, and plutonic igneous activity created a complex fabric in the basement rock of Colorado (Grose, 1972) The Precambrian units were covered by marine and continental sedimentation during the lower Paleozoic (carbonate and siliciclastic rock units were deposited unconformably on the Precambrian basement) Most of these units were later eroded by multiple Paleozoic diastrophisms, thus removing Cambrian to Mississippian rocks from the Denver Basin area (Kent, 1972)

Middle Pennsylvanian orogenic activity formed the Ancestral Rockies, and the Fountain Formation was deposited unconformably on the uplifted Precambrian basement (Figure 3-4) The Fountain Formation contains coarse clastics derived from the erosion of the Ancestral Rockies and deposited as alluvial fans along a continental margin (Martin, 1965) The result was nonmarine sedimentation that occurred in northeastern Colorado from the Triassic to early Cretaceous This sedimentation deposited a sequence of aeolian, fluvial-deltaic, and lacustrine units



(after Rockwell International, 1986a)

Figure 3-3: STRUCTURE OF THE DENVER BASIN



(after LeRoy and Weimer, 1971)

Figure 3-4: GENERALIZED STRATIGRAPHIC SECTION, Golden-Morrison Area

known as the Lyons, Lykins, Ralston Creek, Morrison, and Dakota Formations (Figure 3-4) (Kent, 1972)

The Pierre Shale, consisting of more than 5,600 feet of shales and siltstones, was deposited in the final phases of oceanic sedimentation The sedimentation resulted from the last oceanic transgression occurring 100 million years ago during the late Cretaceous This transgression formed an epicontinental sea called the Cretaceous Seaway that covered the eastern portions of New Mexico, Colorado, and Wyoming

Following deposition of the Pierre, the ocean began to regress and deposition of the Upper Cretaceous Fox Hills and Laramie Formations occurred These formations contain sandstones, siltstones, claystones, and coals deposited in fluvial-deltaic and lacustrine environments (Weimer, 1973) Deposition of the Laramie was influenced and then stopped by the Laramide Orogeny, a major mountain building event that began in the late Cretaceous and caused uplift of the Colorado Front Range Mountains and the eastward tilting of the Denver Basin

The Upper Cretaceous Arapahoe Formation was deposited on an erosional surface marking the end of deposition of the Laramie Major uplift of the Front Range and downwarp of the Denver Basin continued during deposition of the Arapahoe Formation Coarse pebble conglomerate lenses deposited in alluvial fans commonly occur in the Lower Arapahoe, however, conglomerate lenses have not been found at Rocky Flats Plant Claystone and sandstone units flank and top the alluvial fan deposits (Weimer, 1973)

The Denver Formation was deposited above the Arapahoe and is over 600 feet thick This formation contains a variety of lithologies including siltstones, arkoses, conglomerates, and basalt flows (near Golden, Colorado) (Robson, 1984)

The Dawson Formation was deposited above the Denver in a similar geologic environment during the late Cretaceous and early Tertiary Robinson (1972) described the Dawson Formation as a stratigraphic equivalent to the Denver Formation in southern portions of the Denver Basin However, Robson (1984) mapped the Dawson as a separate, younger (Tertiary) formation occurring above the Denver The Dawson is up to 600 feet thick and consists of conglomerates, sandstones, and shales (Robson, 1984)

The Tertiary Green Mountain Conglomerate was deposited unconformably on the Denver Formation, and consists of conglomerates, sandstones, siltstones, and claystones deposited by a local fluvial system that occurred only in the Golden, Colorado, area This unit is only found capping Green Mountain, approximately 15 miles south of Rocky Flats Plant (Costa and Bilodeau, 1982)

The Rocky Flats Alluvium was deposited on top of a major erosional surface that developed in late Tertiary time Before deposition of the Rocky Flats Alluvium, both the Dawson and Denver Formations were completely removed by erosion The Green Mountain Conglomerate may never have been deposited at the site, but if it was, it also was removed by erosion The Rocky Flats Alluvium contains boulders, cobbles, gravels, sands, silts, and clavs deposited in alluvial fans at the base of the Colorado Front Range Mountains (Hurr, 1976)

Following deposition of the Rocky Flats Alluvium, the material was partially removed by erosion and the resulting drainages repeatedly infilled with more recent sediments The Verdos Alluvium and the younger Slocum Alluvium are the result of drainage infilling associated with glacial activity Similar processes are occurring now with an active valley fill alluvium in the stream channels and a recent but stable terrace above the valley fill

3 3 2 Plant Bedrock Geology

Bedrock units mapped at the Plant consist of the Laramie and Arapahoe Formations (Rockwell International, 1986) These are shown in cross section in Figure 3-5 Because of the thickness (750 to 800 feet) and low permeability of the Upper Laramie, it is considered to be the base of the hydrologic system which could be affected by Plant operations (Hurr, 1976) The Upper Laramie and overlying Arapahoe Formations are described below

Laramie Formation

The Laramie Formation is a fluvial sequence of sandstones, siltstones, claystones, and coals, which is subdivided into two major lithologic units a lower sandstone unit and an upper claystone unit The lower sandstone unit is exposed in clay pits west of the Plant, and the upper claystone unit was observed in outcrop and in cores of several 1986 monitor wells west of the Plant The descriptions presented below are taken from Rockwell International (1986)

Lower Sandstone Unit The lower sandstone unit consists of light to medium gray, very fine- to medium-grained, well sorted, subrounded to subangular quartzose sand with up to 25% lithic fragments Sandstones are typically fair to poorly

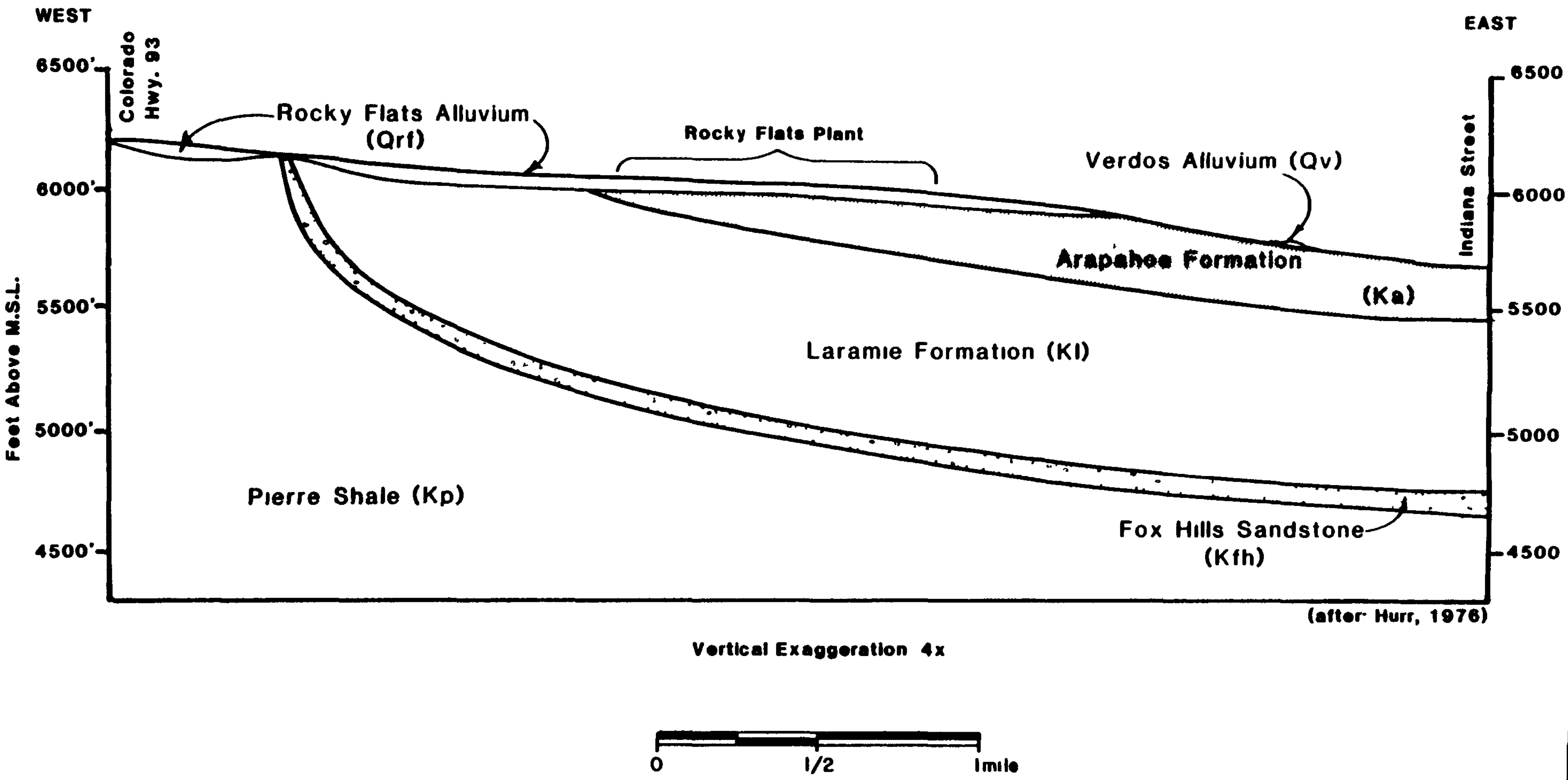


Figure 3-5: GENERALIZED CROSS SECTION OF ROCKY FLATS PLANT

indurated and cemented with silica Individual sandstone beds are 5 to 15 feet thick and are interbedded with white to light gray claystones The claystones are organic-rich and kaolinitic and have been mined from the clay pits west of the plant Individual claystone beds are 10 to 15 feet thick Sedimentary structures observed in outcrop include planar, angular, and trough crossbeds, load structures, fluid escape structures, and ripple marks Plant fossil casts and molds of branches, stems, and leaves are concentrated along bedding planes The contact between the lower sandstone unit and the upper claystone unit is gradational and was selected where thick sandstone beds and kaolinite-rich claystones are less abundant

Upper Claystone Unit The upper claystone unit consists primarily of dark olive gray (5 Y 2/1) (GSA Rock Color Chart), poorly indurated claystones Upper Laramie claystones generally weather to a light olive gray (5 Y 4/1) and may have dark yellowish orange (10 YR 6/6) iron staining along bedding planes and secondary fractures These claystones appear quite similar to Arapahoe claystones in outcrop

Thin sandstone lenses (less than three feet thick) also occur in the upper Laramie These sandstones are typically yellowish gray (5 Y 8/1), fine- to very fine-grained, well sorted, subangular, and calcareous Core data (well 50-86) indicate that thin beds of white, kaolinite-rich claystone typical of the Lower Laramie occur in the Upper Laramie as well

The contact between the Upper Laramie claystones and the Lower Arapahoe sandstones is gradational and was selected using core data The contact was picked below the first Arapahoe sandstone greater than five feet thick (Rockwell

International, 1986) This is consistent with the stratigraphic horizon picked as the base of the Arapahoe Formation at Rocky Flats Plant by Hurr (1976, 1985)

Arapahoe Formation

The Arapahoe Formation consists of fluvial claystones with interbedded lenticular sandstones and siltstones Contacts between these lithologies are both sharp and gradational The claystones are olive gray (5 Y3/2) to dark gray (N 3/0), poorly indurated, silty, and contain up to 15 percent organic material Weathering has penetrated from 10 to 40 feet into bedrock The weathered claystone is light olive gray, blocky, slightlv fractured, and has iron staining as mottles and along bedding planes and fractures (Rockwell International, 1986)

Sandstones in the Arapahoe Formation are light gray (N 6/0) to yellowish gray (5 YR 8/1), very fine- to medium-grained, with approximately 15 percent silt and clay The sandstones are lenticular, discontinuous, and stratigraphically complex The sand grains are subangular to subrounded and are predominantly quartzose with 10 percent lithic fragments The sandstones are poorly to moderately cemented and exhibit ripple marks, load casts, and planar, angular, and trough crossbedding Arapahoe Formation siltstones exhibit the same coloration, constituents, bedding characteristics, and sedimentary structures as the sandstones, however, they consist predominantly of silt-sized particles (Rockwell International, 1986)

3 3 3 Plant Surficial Geology

There are six distinct Quaternary unconsolidated units of surficial materials in the vicinity of the Plant Rocky Flats Alluvium, Verdos Alluvium, Slocum Alluvium, terrace alluviums, valley fill alluvium, and colluvium (Figure 3-6)

The Rocky Flats Alluvium is topographically the highest and the oldest of the alluvial deposits The alluvium unconformably overlies the Laramie and Arapahoe Formations in the vicinity of the Plant The deposit is a series of laterally coalescing alluvial fans deposited by streams (Hurr, 1976) The fans were deposited on an erosional surface cut into the bedrock units, including channelization around the hogbacks of the lower Laramie

The alluvium consists of sand, clay, silt, gravel, cobble, and occasional boulder deposits Locally, the alluvium is cemented with calcium carbonate in the form of caliche Color of the alluvium is pale to dark yellowish brown The sands range from very fine-grained to medium-grained and poorly to moderately sorted The thickness of the alluvium is variable due to deposition on an erosional surface and recent erosional processes The alluvium is thickest to the west of the Plant, where less has been eroded, and thinnest to the east of the Plant (Rockwell International, 1986)

Various alluvial deposits occur topographically below the Rocky Flats Alluvium in the drainages and include the Verdos, Slocum, terrace, and valley fill alluviums and colluvium (Figure 3-7) These deposits are primarily composed of reworked Rocky Flats Alluvium with the addition of some bedrock material Each unit is described below

YEARS before preser	EPOCH	GLACIAL SEQUENCE		DEPOSIT			
1000	HOLOCENE	Gannett Peak Stade	"Valley Fill"	post-Piney Creek Alluvium	young alluvial fan	colluvium and landslides	loess and eolian sand
2000		Interstade		(Soil) Piney Creek Alluvium			
3000		Temple Lake Stade					
5000		"Altithermal Interval"		(Soil) pre-Piney Creek Alluvium			
12,000	PLEISTOCENE	WISCONSIN: Pinedale Glaciation	Terrace Alluvium	(Soil) Broadway Alluvium	old alluvial fan		
60,000		WISCONSIN: Bull Lake Glaciation		Louviers Alluvium			
130,000		Sangamon Interglaciation		(Soil) Slocum Alluvium	?	?	
250,000		ILLINOIAN			?	?	
600,000		Yarmouth Interglaciation		(Soil) Verdos Alluvium	?	?	
		KANSAN			?	?	
1,000,000		Aftonian Interglaciation		(Soil) Rocky Flats Alluvium	?	?	
1,500,000		NEBRASKAN			?	?	
	Pleistocene or Pliocene			Pre-Rocky Flats Alluvium			

(after Van Horn, 1976, and Scott, 1965)

Figure 3-6: SURFICIAL ALLUVIAL DEPOSITS IN THE ROCKY FLATS AREA

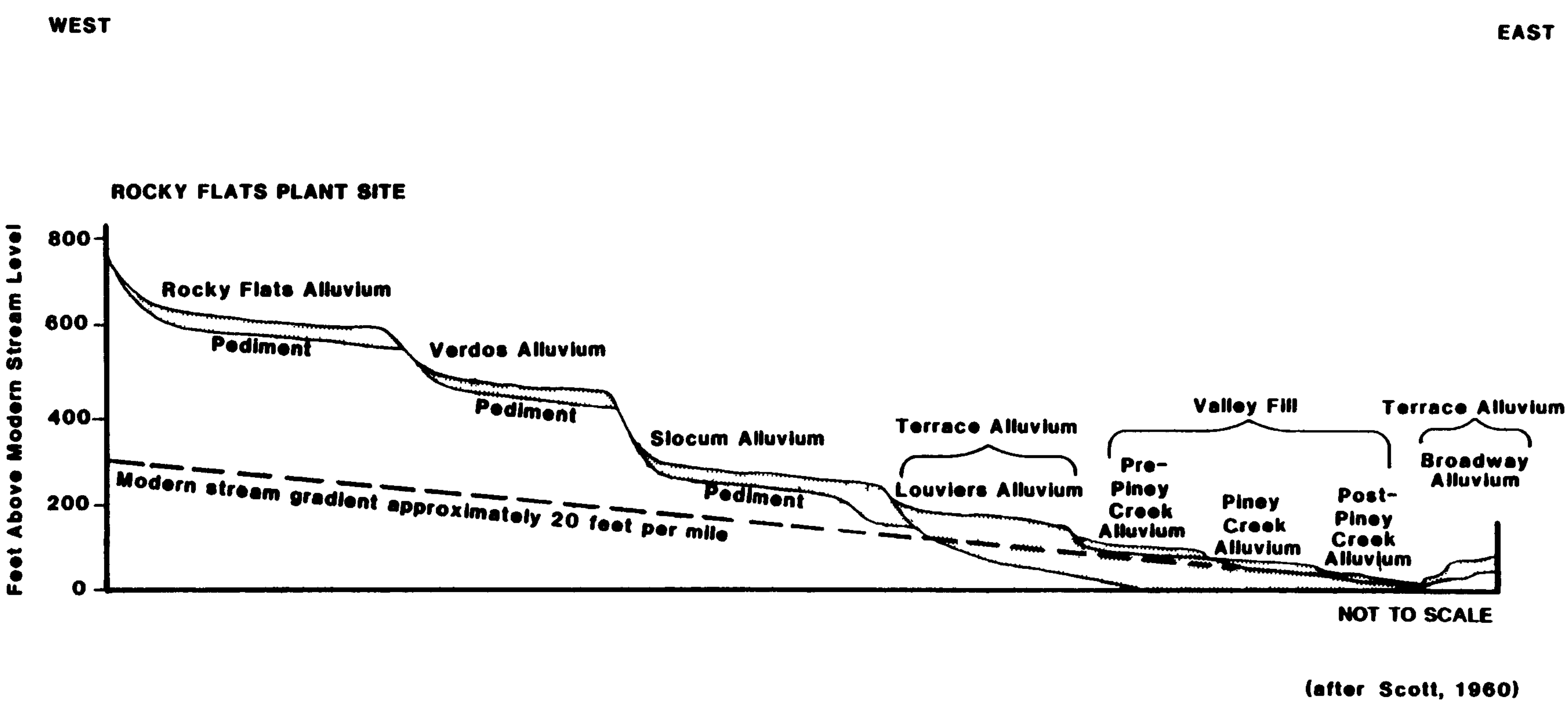


Figure 3-7:
EROSIONAL SURFACES AND ALLUVIAL DEPOSITS EAST OF THE FRONT RANGE, COLORADO

The Verdos Alluvium occupies a topographic position about 0 to 100 feet below the adjacent top of the Rocky Flats Alluvium The Verdos was deposited around the periphery of the present extent of the Rocky Flats Alluvium as fans and channel filling derived by erosion of the older Rocky Flats Alluvium The maximum thickness is about 40 feet, occurring as terraces in valleys east of the Plant The alluvium consists of unsorted gravels, sands, and clays similar to the Rocky Flats Alluvium, but the material is whitish gray in color (Rockwell International, 1986)

The Slocum Alluvium is a poorly sorted gravel deposit containing much sand, silt, and clay derived from erosion of bedrock and the older gravel deposits The formation has a maximum thickness in the vicinity of the Plant of about 20 feet, but is commonly 5 to 10 feet thick It occupies a topographic position of about 150 to 300 feet below the top of the Rocky Flats Alluvium, and occurs downslope of the Verdos Alluvium in valleys east of the Plant site (Rockwell International, 1986)

Locally, two Wisconsin-age terraces are associated with the present drainages The terrace alluvium occurs 5 to 35 feet above recent valley floors The alluvium is comprised of gravels, sands, and clays, derived from bedrock and reworking of older alluvial deposits The terrace alluvium can rarely occur up to 30 feet in thickness, however, the thickness is usually around 5 feet The alluvium occurs in valleys surrounding the Plant (Rockwell International, 1986)

Valley fill alluvium occurs in the bottom of the present stream valleys around the Plant The valley fill ranges from dark-brown, sandy, clayey silt to moderately sorted cobbles and small boulders, recently reworked from previously deposited alluviums The valley fill along streams which head on the Rocky Flats Alluvium and have not yet cut through to bedrock tends to be coarse and have little or no fine material However, where the valley fill is deposited on bedrock, 0 5 to 2 feet of cobbly sand and gravel commonly is overlain by several feet of sandy, clayey silt (Rockwell International, 1986) Subsequent erosion and deposition locally may have added more sand, gravel and cobbles on top of the silt, or cut through the valley fill to expose bedrock along the channel bottom (Hurr, 1976)

Colluvium, produced by mass wasting and downslope creep, collects on the sides and at the base of hills and slopes These deposits are poorly sorted mixtures of soil and debris from bedrock clay and sand mixed with gravel and cobbles derived from the older Rocky Flats Alluvium The colluvium consists predominantly of clay with common occurrences of sandy clay and gravel Color is yellowish brown to dusky brown and caliche is common locally The thickness of the colluvium ranges from 3 to 22 feet (Rockwell International, 1986)

3 3 4 Regional Bedrock Structure

The general geologic structure of the area is north-striking sedimentary beds with dips to the east away from the Front Range Monocline Dips are quite steep west of the Plant in the Fox Hills Sandstone and Laramie Formation (on the order of 50 degrees or greater) These units are flanked on the west by Precambrian terrain of the Front Range Uplift and on the east by gently dipping sedimentary beds of the Denver Basin However, because the axis of the monocline onto the Front Range appears to be inclined to the east, dips become rapidly more gentle, on the order of 7 to 15 degrees beneath the Plant itself (Rockwell International, 1986) A major bounding fault between the Front Range and the Denver Basin, the Golden Fault, runs north-south several miles west of the Plant at the mountain front (Figure 3-7)

The majority of the displacement on the Golden Fault, the uplift of the Front Range and subsidence of the Denver Basin, occurred during the late Cretaceous to early Eocene Laramide Orogeny about 40 to 70 million years ago (Martin, 1965) Erosion during the Laramide Orogeny is believed to have kept pace with uplift and the Front Range probably never stood very high above the Denver Basin during the orogeny By the late Eocene, an erosional surface of low relief covered much of the Rocky Mountain Region

The mountains west of the Rocky Flats Plant are the result of Post-Laramide tectonics and erosion About 5,000 to 10,000 feet of uplift has taken place in the Rocky Mountain Region since the early Miocene about 25 million years ago Late Tertiary block faulting is believed to have accompanied the regional uplift as indicated by apparent displacements of the late Eocene erosional surface (Scott, 1975 and Epis and Chapin, 1975) There is some evidence that block faulting has continued into the Quaternary (Scott, 1970, Whitkind, 1976, and Kirkham and Rogers, 1981)

In 1981, extensive studies were done to evaluate the Quaternary history of the Golden Fault and other faults at the Rocky Flats Plant and vicinity (Dames and Moore, 1981) The Golden Fault studies did not produce any evidence of tectonic activity along the Golden Fault within the past 500,000 years, and the fault does not have surficial expressions characteristic of geologically young fault zones

Hurr (1976) showed a fault crossing the eastern edge of the Plant, based on a series of bedding irregularities that appeared to be an extension of the previously mapped Eggleston Fault (northwest of the site) Further investigations of the feature (Dames and Moore, 1981) revealed that it is probably a penecontemporaneous growth fault attributed to slumping of the unconsolidated Arapahoe Formation before burial and lithification The Denver Basin has been tectonically stable for about 28 million years with the exception of a series of earthquakes associated with waste injection at

NOTICE

This document (or documents) is oversized for 16mm microfilming, but is available in its entirety on the 35mm fiche card referenced below:

Document # 000297

Titled: Original Process Waste Line Report Rocky Flats Plant Monitor Well Locations Plate 4-1

Fiche location: A-SW-M19

NOTICE

This document (or documents) is oversized for 16mm microfilming, but is available in its entirety on the 35mm fiche card referenced below:

Document #000297

Titled: Original Process Waste Line Report Plate 4-2: Original Process Waste Lines, Monitor Well and Borehole Locations, Cross Section Location Lines, and Subcropping Sandstone (Plain View) Map

Fiche location: A-SW-M19

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Document # 000297

Titled: Plate 4-3: Original Process Waste Line Report Surficial Geology MAP

Fiche location: A-SW-M19

NOTICE

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Document # 000297

Titled: Original Process Waste Line Report Plate 4-4 Cross Sections A-A', B-B', C-C', D-D', and E-E'

Fiche location: A-SW-M20

UNITED STATES
DEPARTMENT OF ENERGY

ALBUQUERQUE OPERATIONS OFFICE

ROCKY FLATS AREA OFFICE

UNDERGROUND PIPING AND TANK REMOVAL

ROCKWELL INTERNATIONAL

ROCKY FLATS PLANT

GOLDEN, COLORADO 80402-0464

INDEX OF DRAWINGS

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Rockwell International
ROCKY FLATS PLANT
GOLDEN, COLORADO

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INDEX & TITLE SHEET

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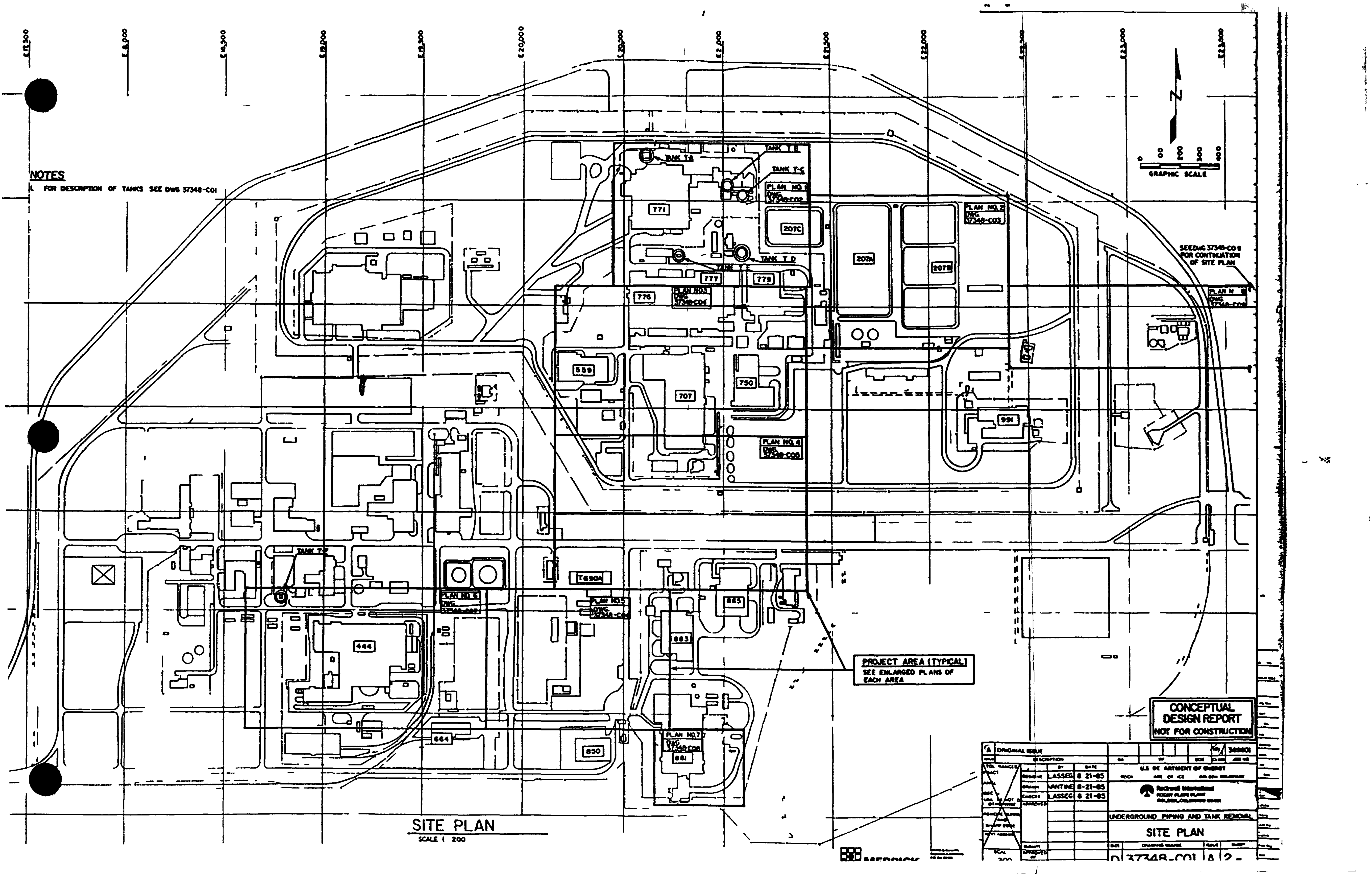
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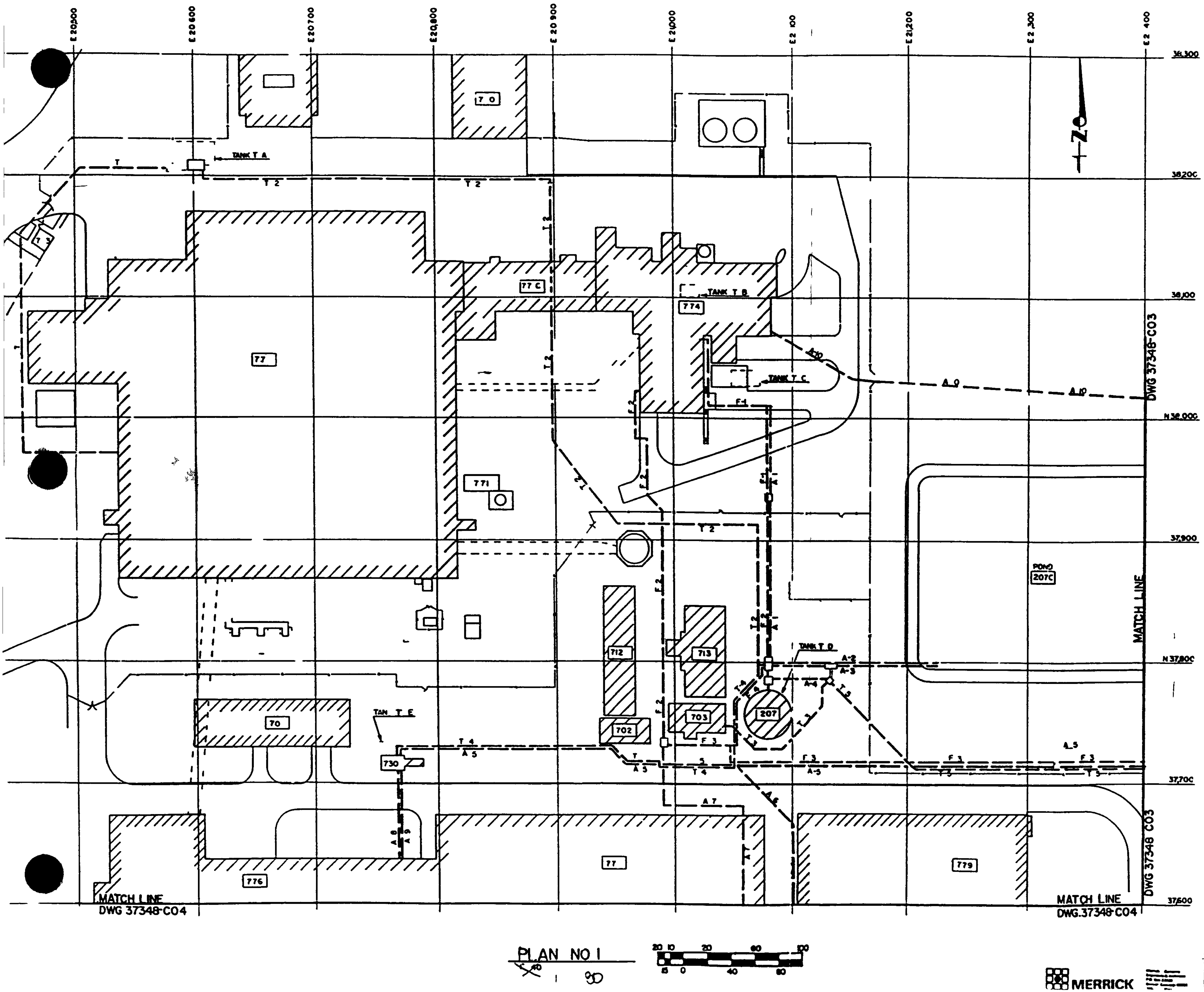

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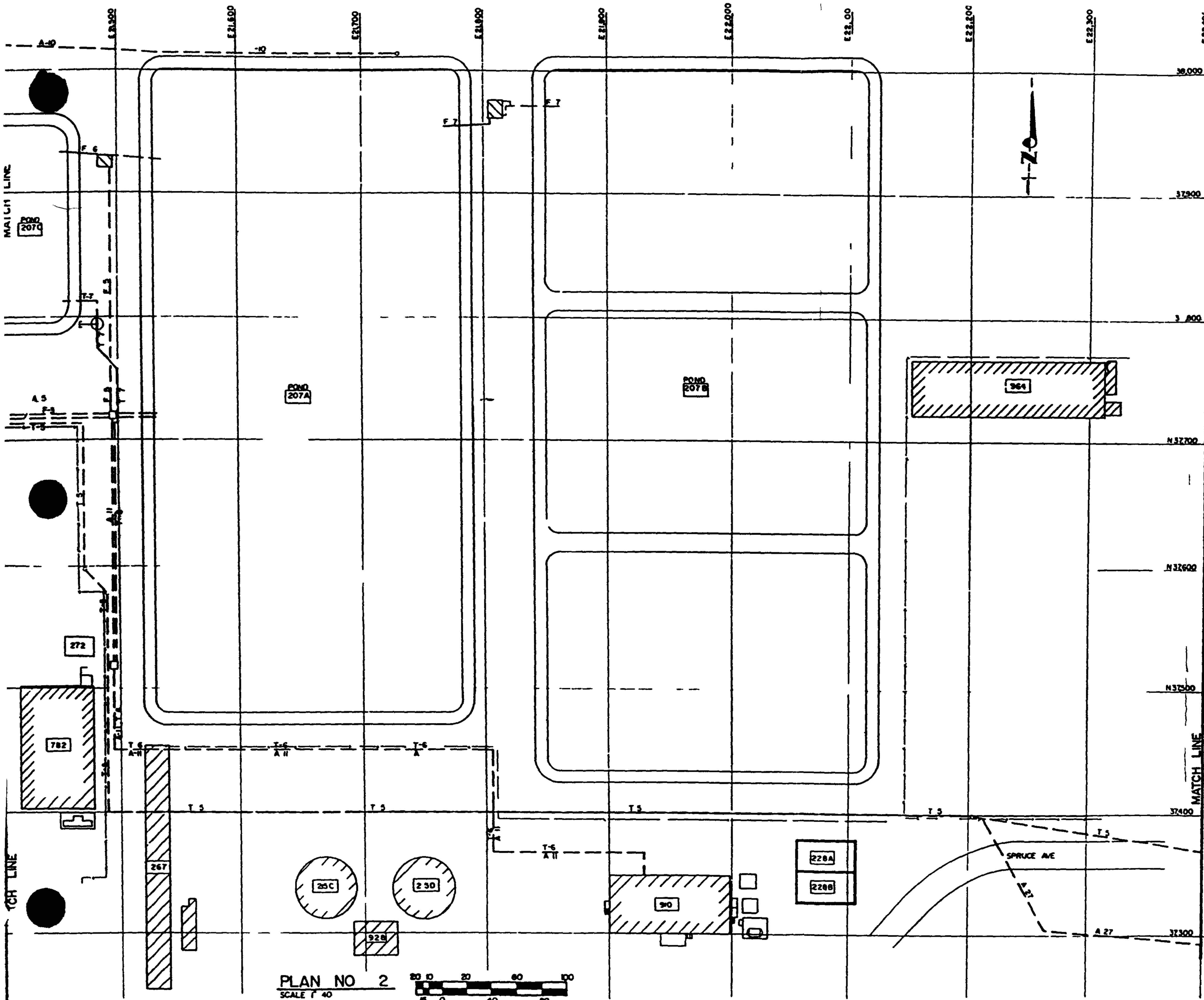

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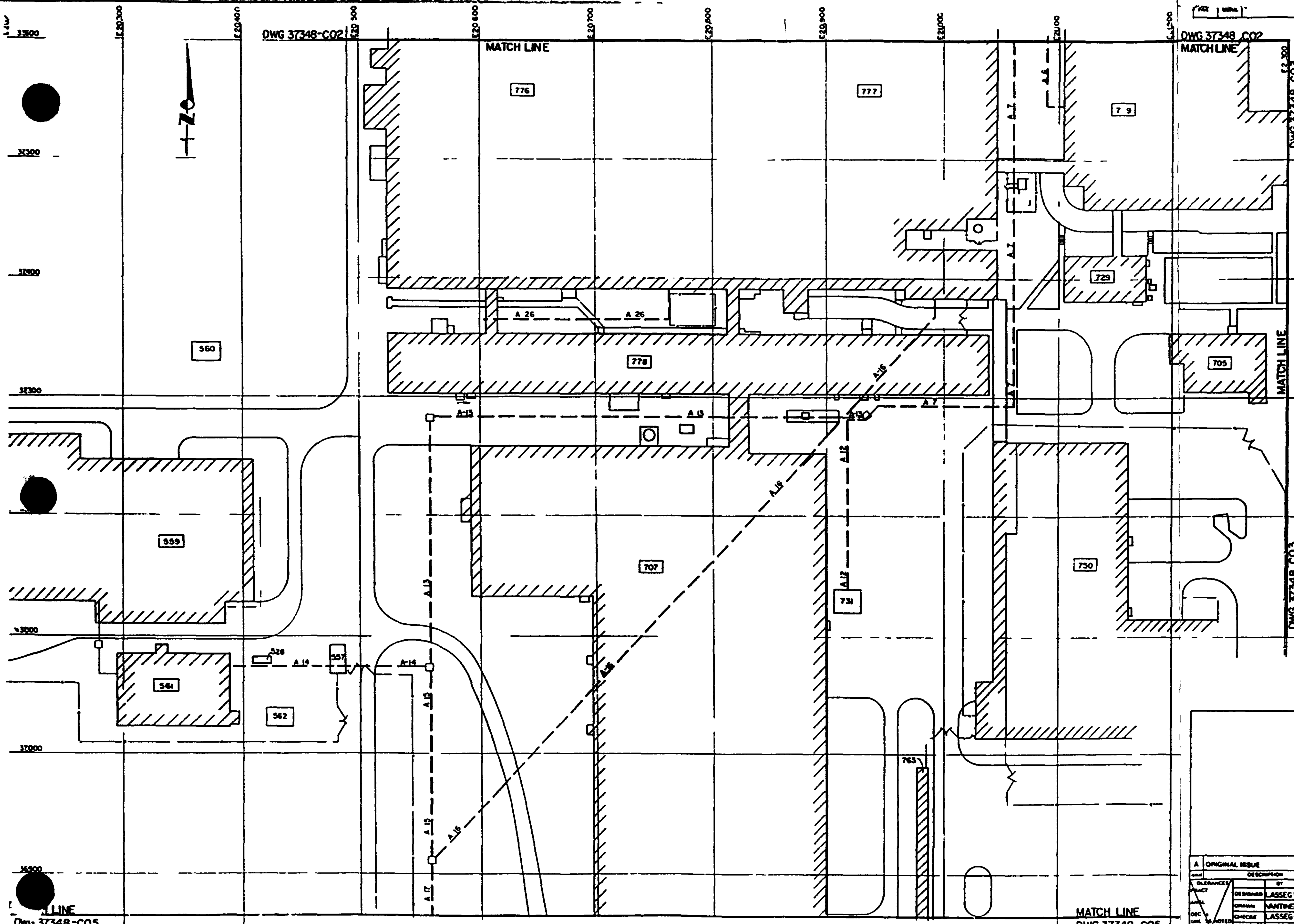

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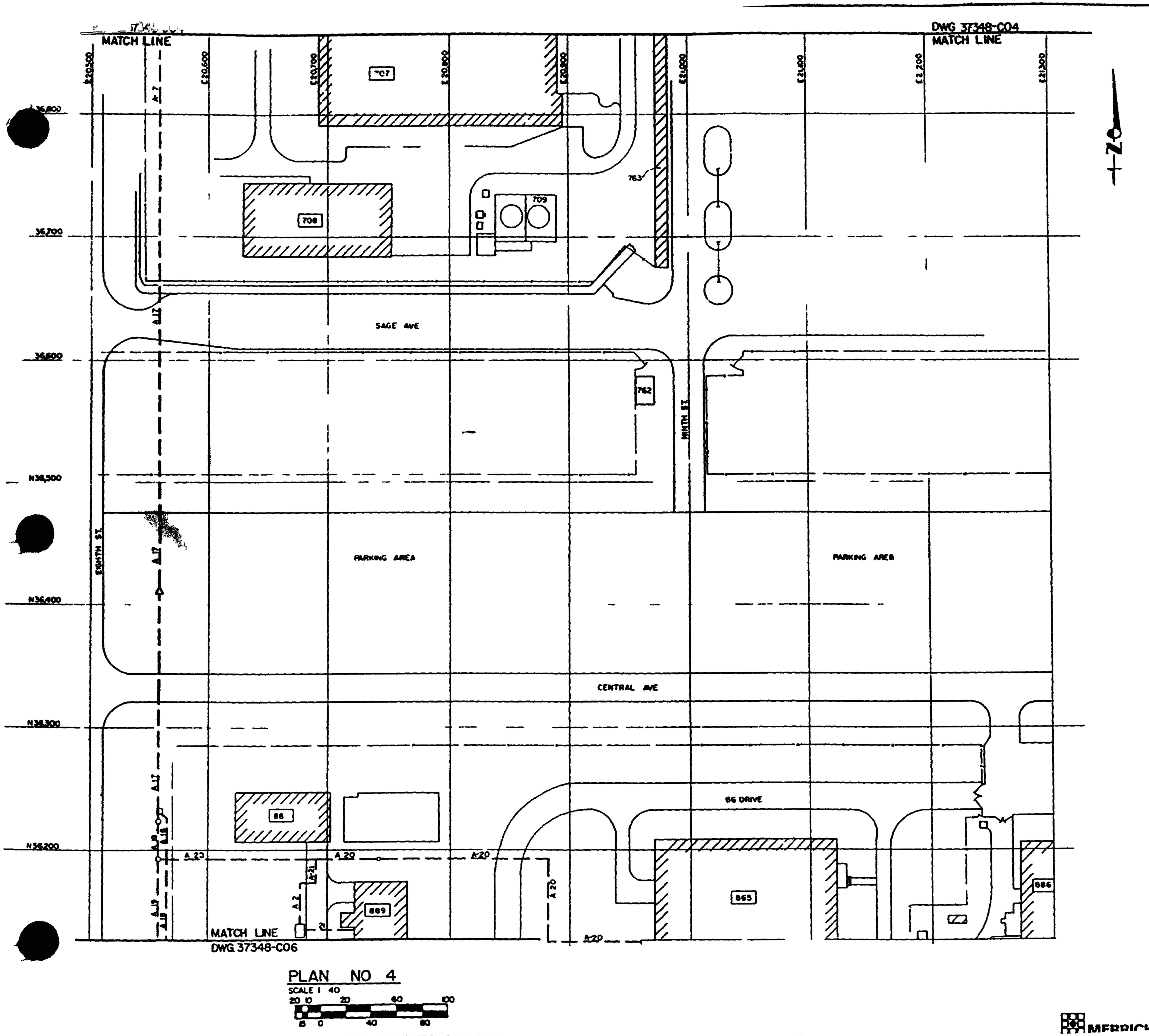

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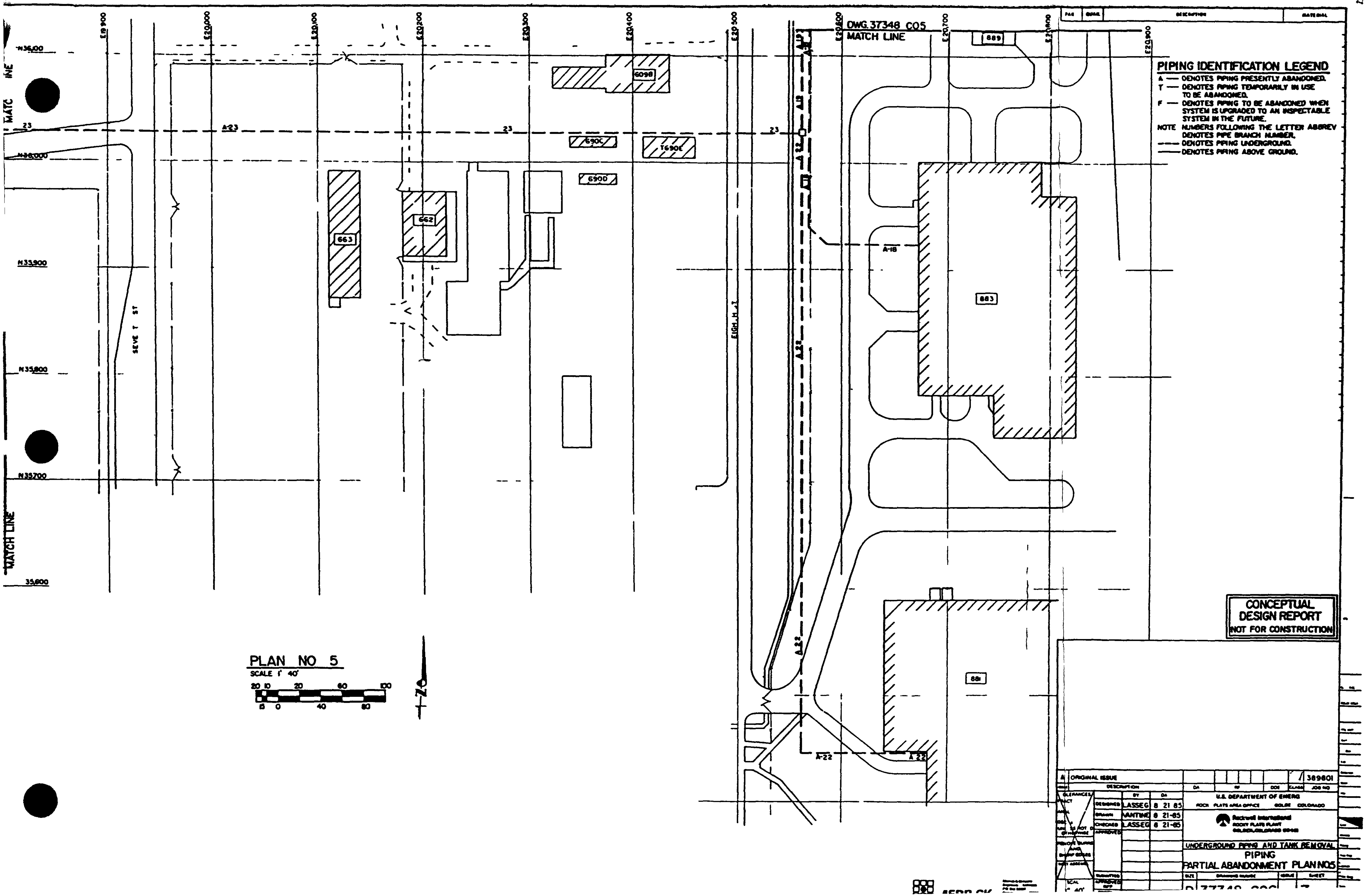
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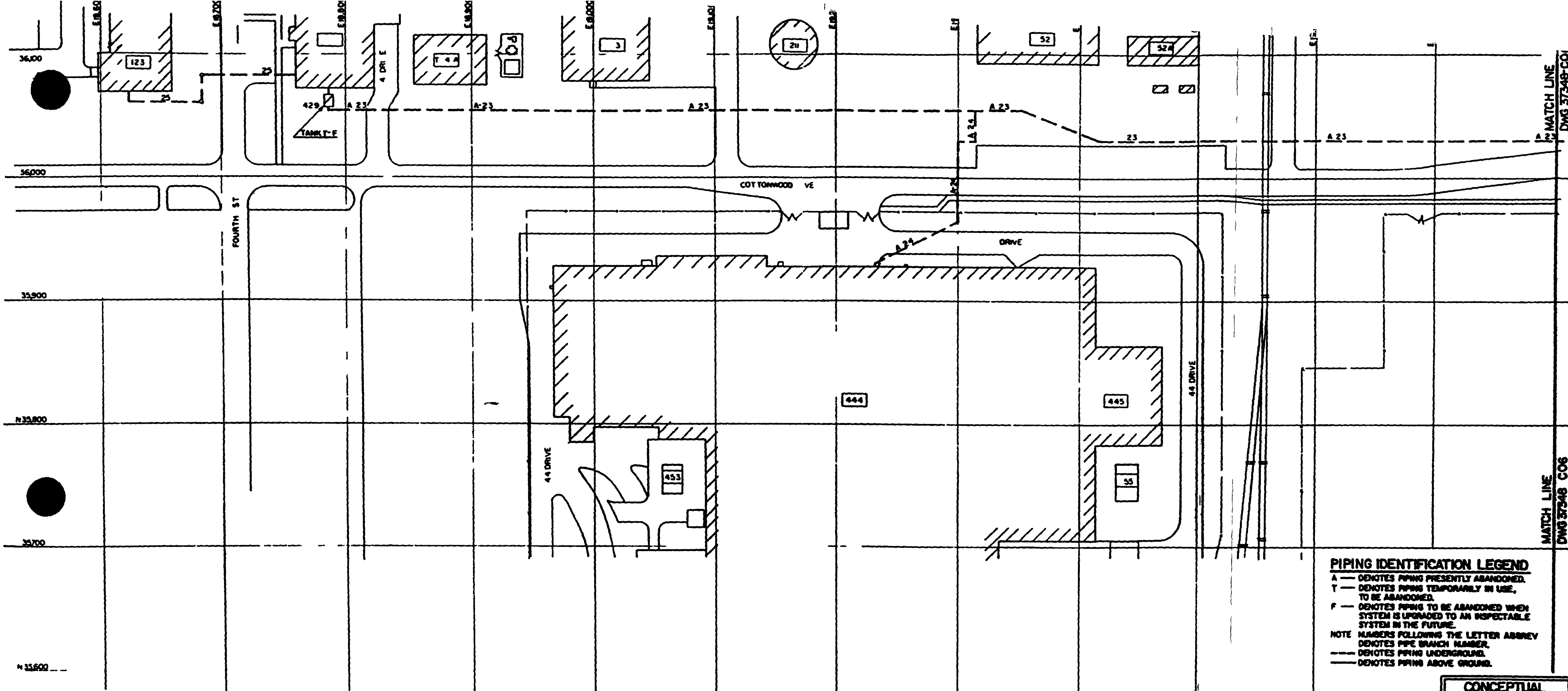

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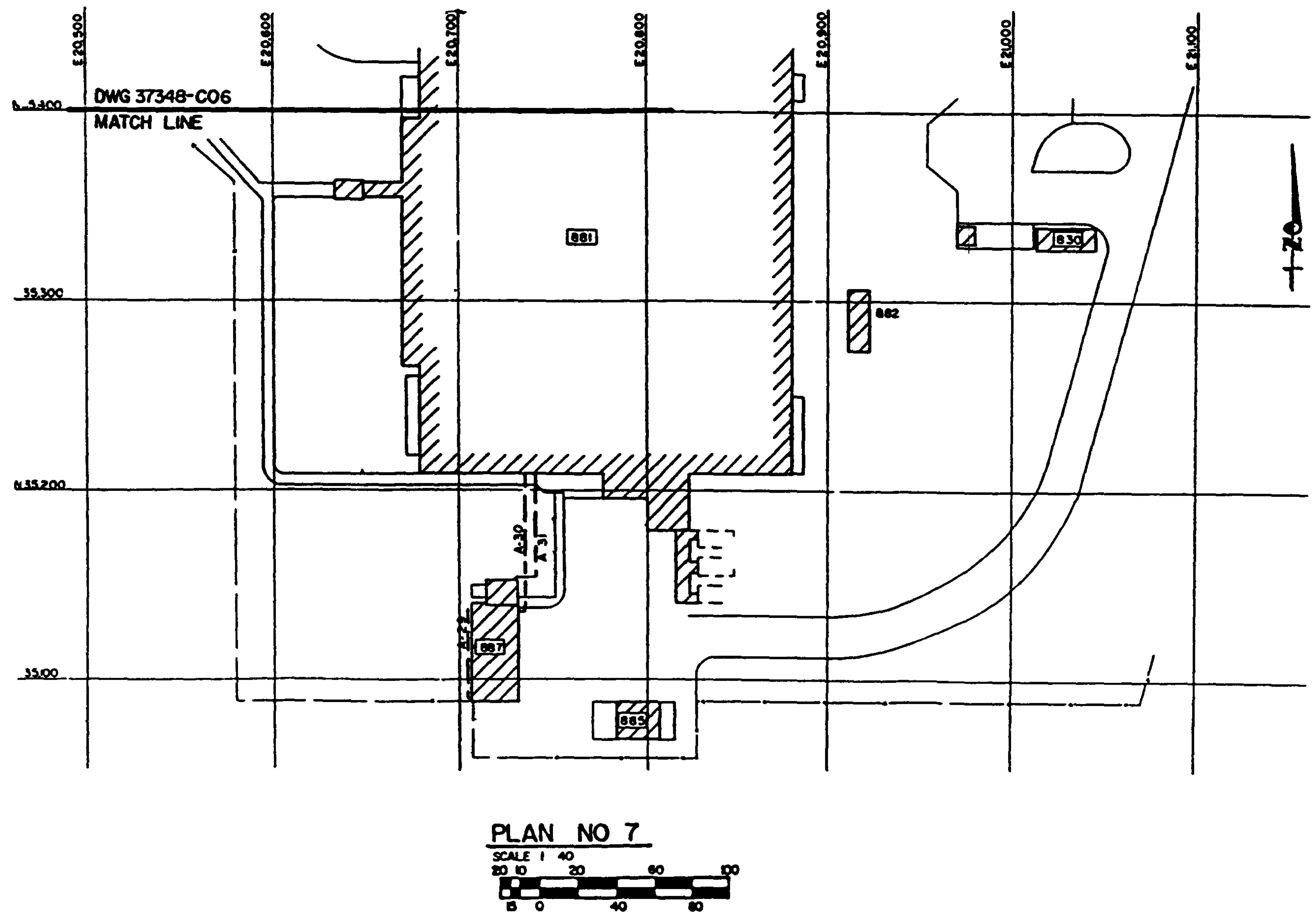
1 389801

SCAL 1 40

D 37348-C07 A 8



PLAN NO 7

SCALE 1 40

PIPING IDENTIFICATION LEGEND

A — DENOTES PIPING PRESENTLY ABANDONED.
T — DENOTES PIPING TEMPORARILY IN USE TO BE ABANDONED.
F — DENOTES PIPING TO BE ABANDONED WHEN SYSTEM IS UPGRADED TO AN INSPECTABLE SYSTEM IN THE FUTURE.
NOTE NUMBERS FOLLOWING THE LETTER ABBREV DENOTES PIPE BRANCH NUMBER.
- - - DENOTES PIPING UNDERGROUND.
—— DENOTES PIPING ABOVE GROUND.

CONCEPTUAL DESIGN REPORT
NOT FOR CONSTRUCTION

MERRICK

A	ORIGINAL ISSUE		
	DESCRIPTION	BY	DATE
DESIGNED		LASSEG	8 21-85
DRAWN		VANTINE	8 21-85
CHECKED		LASSEG	8 21-85
APPROVED			

389801

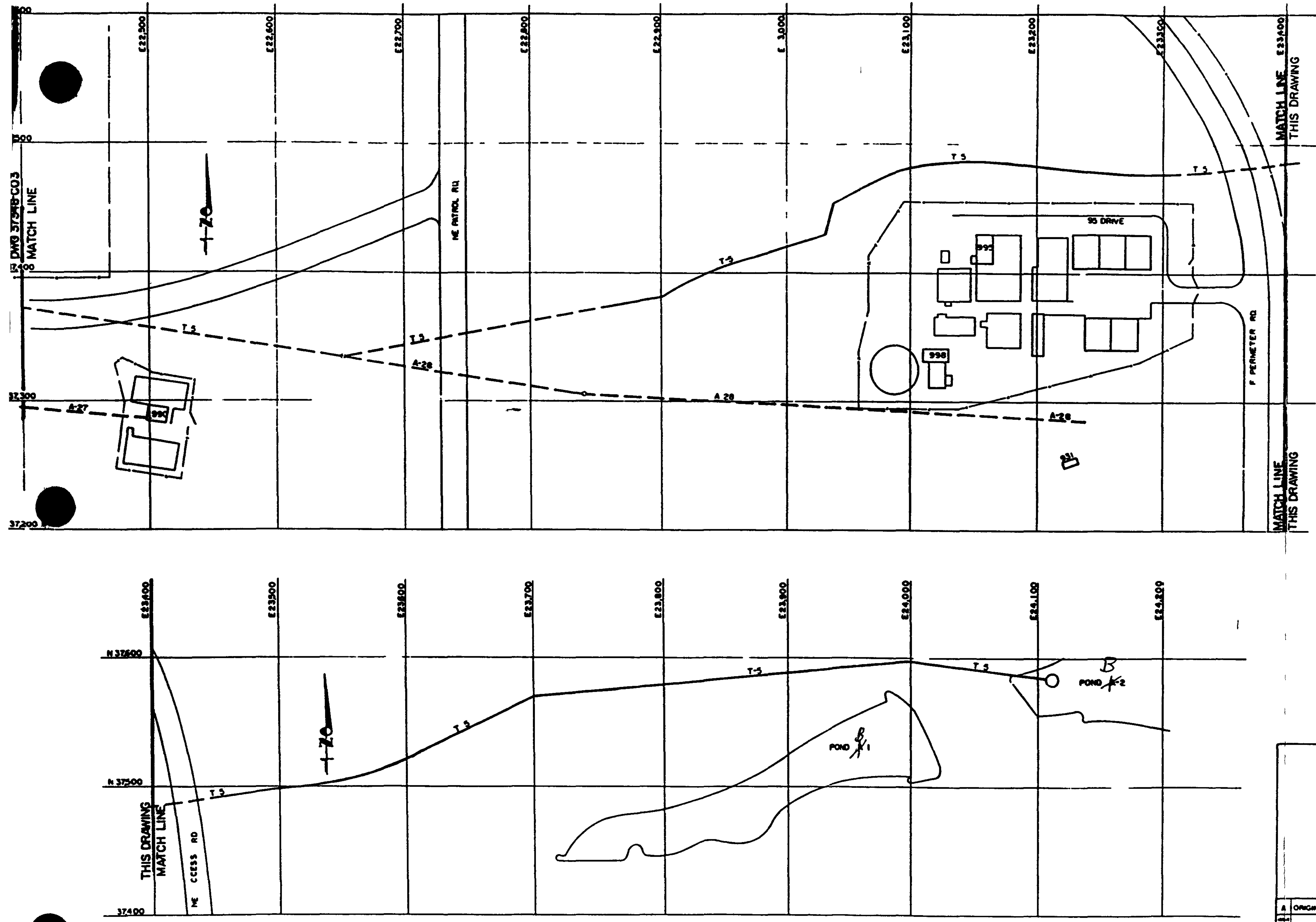
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN COLORADO

Rockwell International
ROCKY FLATS PLANT
GOLDEN, COLORADO

UNDERGROUND PIPING AND TANK REMOVAL
PIPING
PARTIAL ABANDONMENT PLAN NO.7

SCALE 1 40

D 37348-C08 A 9



PLAN NO 8

SCALE 1" 40'

PIPING IDENTIFICATION LEGEND

A — DENOTES PIPING PRESENTLY ABANDONED.
T — DENOTES PIPING TEMPORARILY IN USE TO BE ABANDONED.
F — DENOTES PIPING TO BE ABANDONED WHEN SYSTEM IS UPGRADED TO AN INSPECTABLE SYSTEM IN THE FUTURE.
NOTE NUMBERS FOLLOWING THE LETTER ABBREV DENOTES PIPE BRANCH NUMBER.
— — — DENOTES PIPING UNDERGROUND.
——— DENOTES PIPING ABOVE GROUND.

CONCEPTUAL DESIGN REPORT
NOT FOR CONSTRUCTION

A	ORIGINAL ISSUE		
	DESCRIPTION	BY	DATE
DESIGNED	LASSEG	8 21-85	
DRAWN	MANTINE	8 21-85	
CHECKED	LASSEG	8 21-85	
APPROVED			

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN COLORADO

Rockwell International
ROCKY FLATS PLANT
GOLDEN, COLORADO

UNDERGROUND PIPING AND TANK REMOVAL
PIPING
PARTIAL ABANDONMENT PLAN NO 8

SCALE 1" 40'

D 37348-C09 A 10

389801

MERRICK

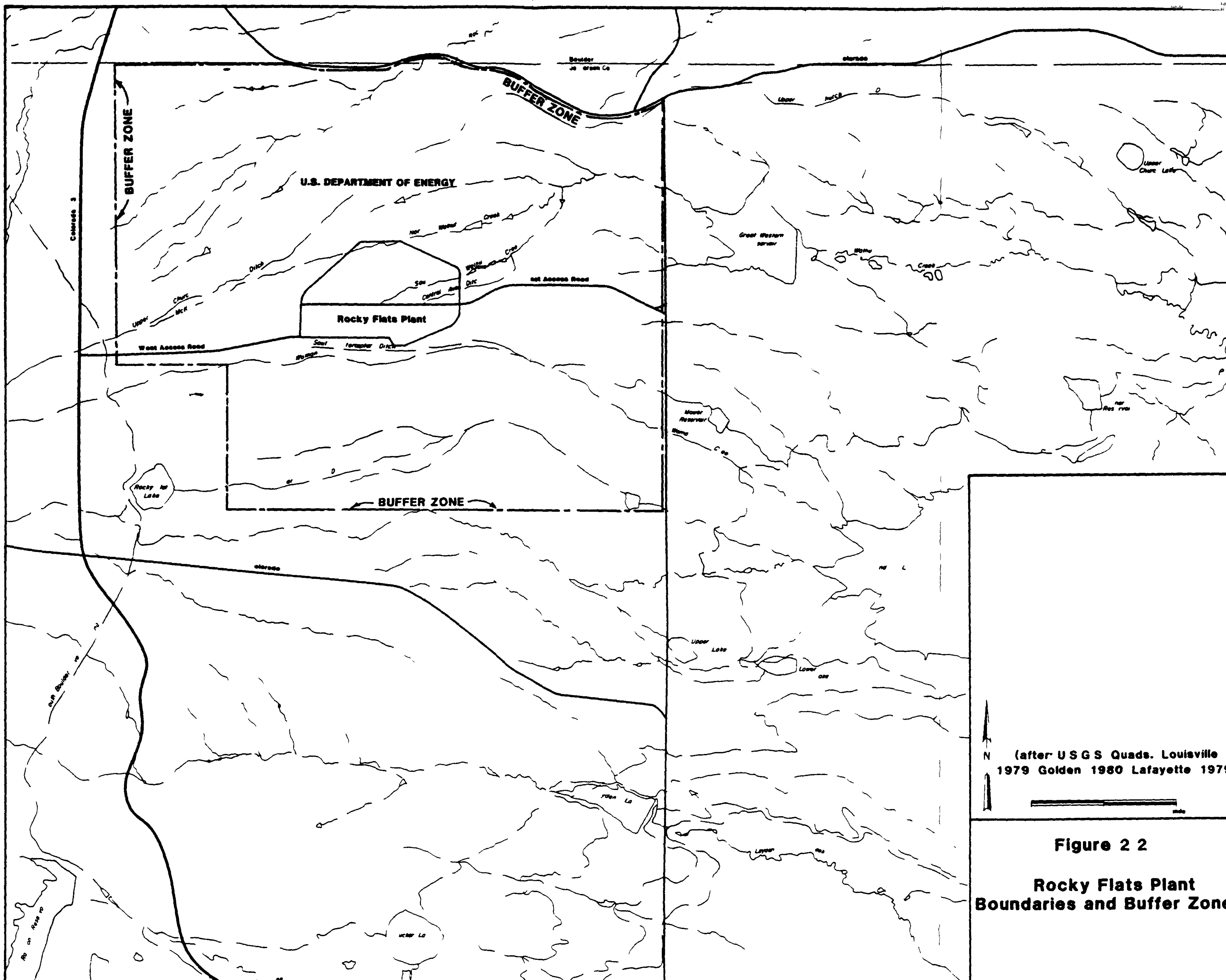
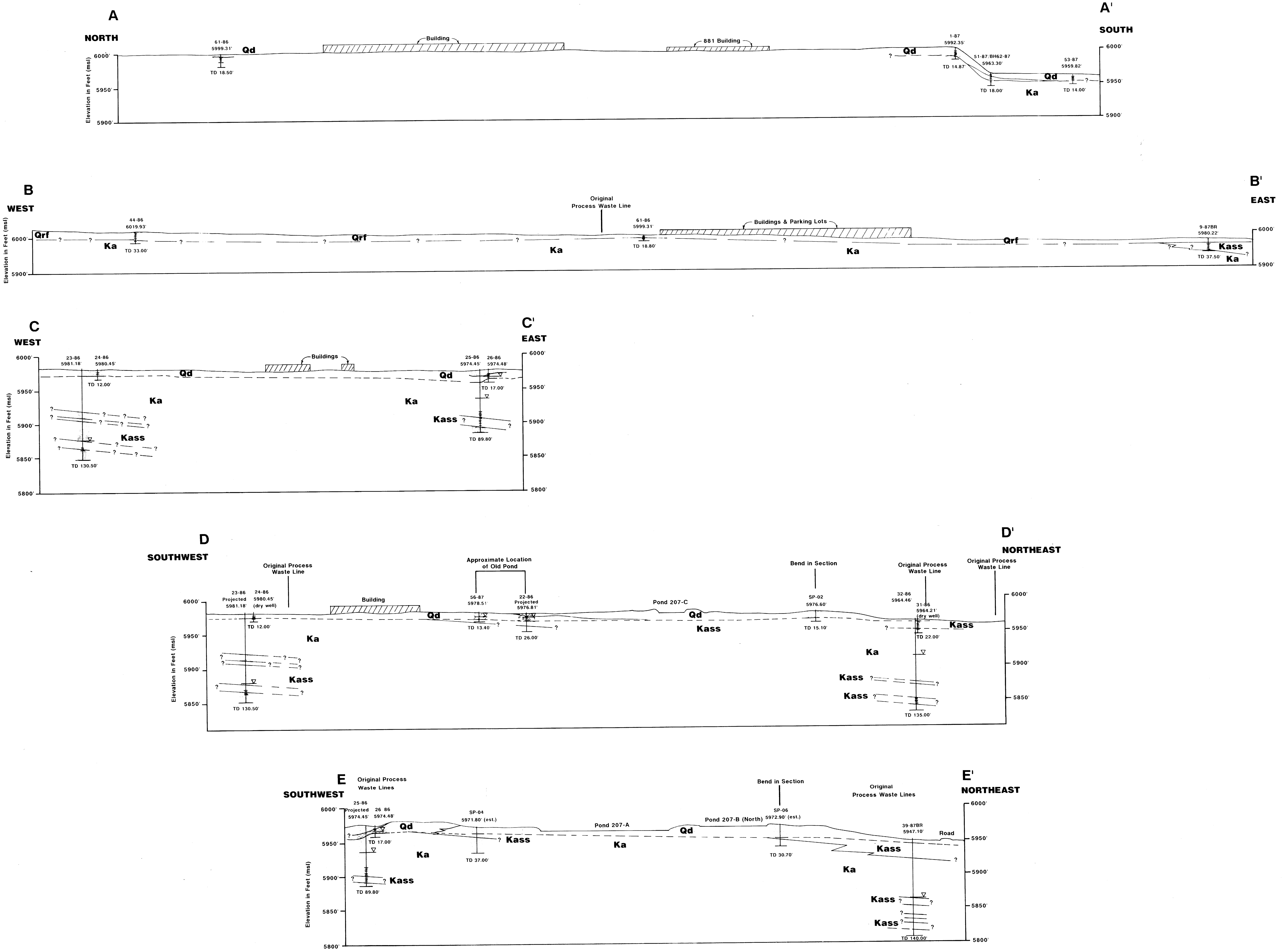


Figure 2 2

Rocky Flats Plant
Boundaries and Buffer Zone



EXPLANATION

SCALE:

50 feet

0 — 50 feet

No Vertical Exaggeration

41-87 — Well Identification
5931.56' — Ground Surface Elevation (Surveyed)

Water level (Measured 4/11/88)

Geologic Contact (dashed where inferred)

Screened Interval

TD 110.00' — Total Depth Drilled

QUATERNARY

Qc — Colluvium

Qd — Disturbed Ground

Qrf — Rocky Flats Alluvium

Qvf — Valley Fill Alluvium

CRETACEOUS

Ka — Arapahoe Formation (Claystone)

Kass — Arapahoe Formation (Sandstone & Siltstone)

Clay

Clayey Sand or Sandy Clay

Sand and/or Sandstone

Sand and/or Gravel

Silt and/or Siltstone

Claystone

NOTE: Cross Section B-B' scale is 1"=100' both Vertically and Horizontally.
All other scales are 1"=50'.
THERE IS NO VERTICAL EXAGGERATION ON ANY CROSS SECTION.

WESTON
MANAGERS DESIGNERS/CONSULTANTS
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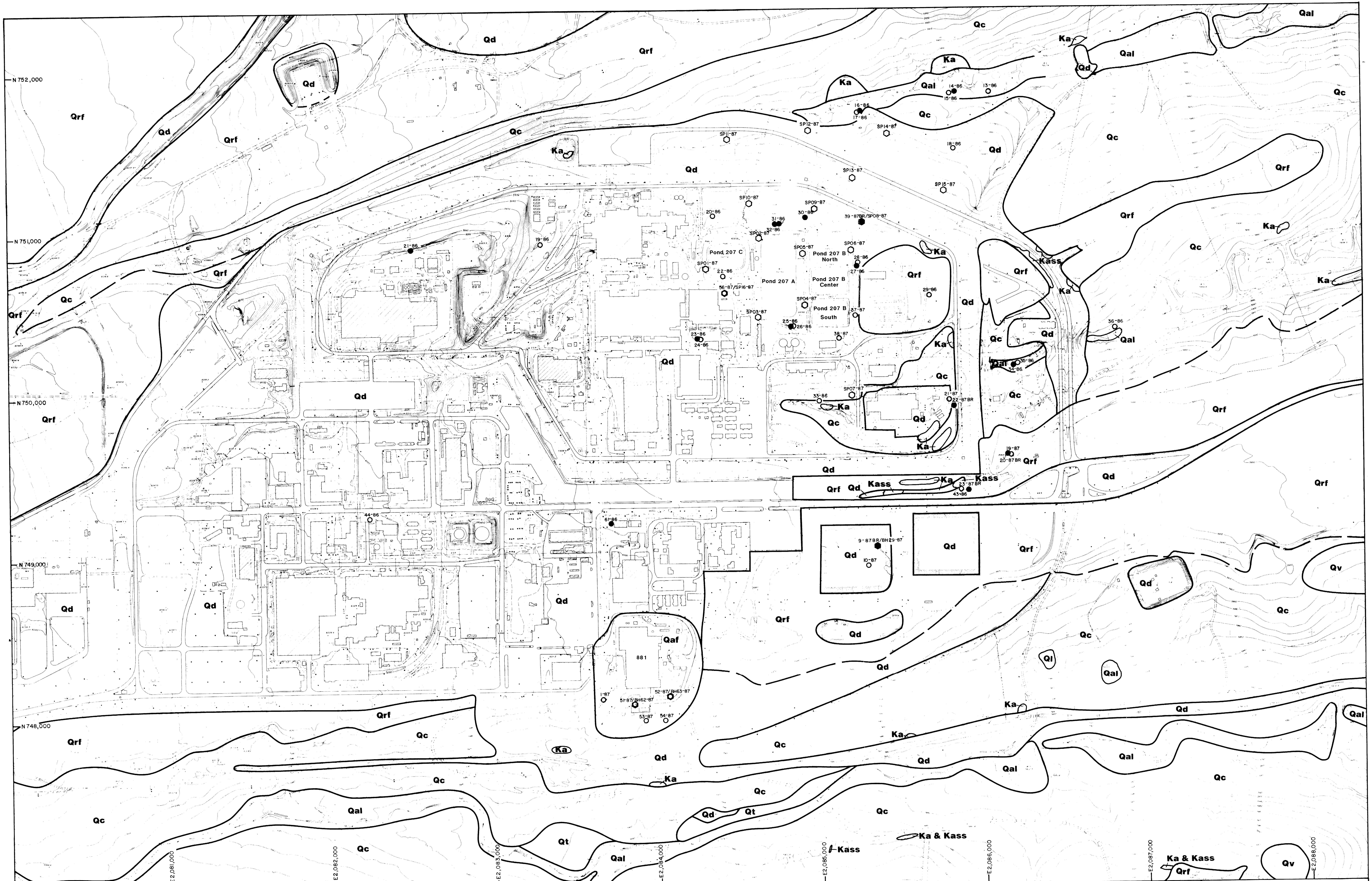
ROCKWELL INTERNATIONAL
Rocky Flats Plant
Golden, Colorado

Original Process Waste Line Report

Plate 4-4

CROSS SECTIONS A-A', B-B', C-C', D-D', and E-E'

October, 1988



EXPLANATION

Qaf	Artificial Fill	Qt	Terrace Alluvium
Qd	Disturbed Ground	Qrf	Rocky Flats Alluvium
Qal	Recent Valley Fill	Qv	Verdos Alluvium
Ql	Landslide	Kass	Arapahoe Formation (Sandstone)
Qc	Colluvium	Ka	Arapahoe Formation (Claystone)
	Phreatophytes		Contact (dashed where inferred)

Contour Interval = 2'
SCALE 1" = 200'
200' 0 200'

N

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Golden, Colorado

Plate 4-3:
Original Process Waste Line Report

SURFICIAL GEOLOGY MAP

October, 1988

EXPLANATION

53-87	Alluvial Monitor Well
9-87BR	Bedrock Monitor Well
BH29-87	Borehole
	Line of Section
	Sandstone Subcropping
	Approximate Location of Original Process Waste Lines

Contour Interval = 2'
SCALE: 1" = 200'
200' 0 200'

N

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Golden, Colorado

Original Process Waste Line Report

Plate 4-2:
ORIGINAL PROCESS WASTE LINES, MONITOR WELL AND BOREHOLE LOCATIONS, CROSS SECTION LOCATION LINES, AND SUBCROPPING SANDSTONE (Plan View) MAP

October, 1988

EXPLANATION

9-87BR Bedrock Monitor Well

18-86 Alluvial Monitor Well

16-74 Existing Wells (Pre 1986)

NOTE: 1986 Well locations resurveyed during 1988.
This plate reflects new locations and elevations.

Contour Interval: 5 feet

Scale: 1"=500'

500' 0 500' 1000 feet

Prepared by: Scharf & Associates, Inc., Denver, Colorado
from photography dated 5/20/86

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Original Process Waste Line Report

Plate 4-1:

ROCKY FLATS PLANT
MONITOR WELL LOCATIONS

October, 1988